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ALBERTA POWER COMMISSION

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ANNUAL REPORT

GOVERNMENT OF THE PROVINCE OF ALBERTA

ANNUAL REPORT

OF THE

ALBERTA POWER COMMISSION

FOR THE YEAR ENDING

DECEMBER 31, 1962

EDMONTON

J. G. MacGREGOR

CHAIRMAN

4th February, 1963.

The Honourable A. Russell Patrick,
Minister of Industry and Development,
Legislative Building,
EDMONTON, Alberta.

Sir:

I have the honour to submit herewith the Annual Report of the Alberta Power Commission for the calendar year ended December 31, 1962.

An audited statement of receipts and disbursements of the Alberta Power Commission will be sent under separate cover.

Respectfully submitted,

ALBERTA POWER COMMISSION,

J.G. MacGregor,
Chairman.

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ALBERTA POWER COMMISSION

1962

J.G. MacGregor,
Chairman

J.E. Oberholtzer,
Member

W.C. Whittaker,
Member

J.L. Reid,
Member
and Secretary

PREFACE

The Alberta Power Commission is not an operating Commission; that is, it does not own or operate any power plants, transmission lines or distribution systems. In this respect it is different from the Power Commissions in all the other Provinces, except Prince Edward Island and Newfoundland. Keeping this in mind, it might be well to consider the duties and the responsibilities of the Power Commission. Its duties at present, under the Power Commission Act, are only those of a regulatory or supervisory nature. These duties are largely covered by Section 6 of the Power Commission Act, which is as follows:

"Whenever required so to do by the Lieutenant Governor in Council, the Commission shall inquire into, examine and investigate, -

(a) water powers and water privileges in Alberta, their value and capacity;

(b) the existing facilities for the manufacture and distribution of power in Alberta;

(c) such other matters relating to power and its distribution in Alberta as the Lieutenant Governor in Council from time to time may require;

and shall report thereon to the Lieutenant Governor in Council."

The Commission feels that, at the present time, its principal duties are threefold:

1. The collection of statistics of the Electric Utility Industry in the Province, and the study of these statistics so that the people of the Province will have a true picture of the industry.
2. The study of hydro-electric sites and other power possibilities in the Province. The Commission also has been engaged in a study of

the existing network of transmission lines in the Province with particular reference to more extensive interconnection which will ensure the most efficient use of the large generating units which are already in operation and of those anticipated in the future.

3. Farm Electrification. This is a phase of its work to which the Commission has devoted much of its time. The main network of farm electrification lines is now practically completed. From here on, with very few exceptions, the additional farms to be electrified will be adjacent to existing lines. While the construction phase of farm electrification is almost over, problems of operating the farm lines are now taking much more time. The Commission is presently engaged in rather detailed studies of the deposit reserves of individual R.E.A.s.

ALBERTA POWER COMMISSION

ANNUAL REPORT

For Year Ending December 31st, 1962.

During 1962, Alberta's progress has been most gratifying and has carried the province to a new height of prosperity. Mineral production, construction activity, manufacturing and the output of electricity have all increased considerably during the year and made advances that broke previous records. To keep pace with the growing industrialization of the province, new, large thermal and hydro generating installations are at various stages of completion and planning. The increase in K.W.H. generated over that of the previous year - a good indicator of economic conditions - has been slightly over 9.4%.

Traditionally, Alberta's economy has been based on agricultural production. During the past fifteen years, however, while its agriculture output has increased, the growth in mineral production and in the manufacturing industries has shot upward to the extent that agriculture now accounts for less than a quarter of the total net value of production. Today, agriculture, mining (including oil and natural gas), construction and manufacturing share almost equally in the total production. Since these four major industries each contribute equally to the public welfare, the overall stability of the province's economy is assured, because it no longer has to depend upon the fluctuations in the single industry such as agriculture, which, in turn, is dependent on the variations of the weather from year to year. Even at that, it is encouraging to see that, dollar-wise, agriculture's contribution to the province's production is increasing.

The value of manufactured shipments continues to increase year by year as new plants commence production and existing plants expand their operations. The year 1962 was no exception, with the estimated value of manufactured shipments totalling $970 million, up 3% over the previous year.

During 1962, several multi-million dollar manufacturing plants were completed and construction commenced on others. Also a number of smaller plants were added to the manufacturing complex of the province.

Particularly encouraging was the fact that a number of plants which had established in the province in the past few years undertook sizeable expansion programmes. Evidently their volume of business exceeded original expectations and expansions were necessitated.

Among the more noticeable projects completed during the year, were a $7.0 million small diameter steel pipe mill, a number of gas processing plants located throughout the province, two packing plants in the $1.0 to $1.5 million range and a $1.0 million milk condensery. Under construction at year end were four gas processing plants valued at $1.0 million to $2.0 million each, one gas processing facility estimated to cost $15.0 million, a brewery valued at $5.0 million and several plant additions in the $500,000 range.

While Alberta's net value of production is increasing relative to its output a decade ago, it is also increasing in relation to the other Prairie Provinces and now can claim approximately 40% of the agricultural production of the Prairies; some 60% of the mining production and over 40% of the manufacturing. In total, it accounts for nearly 50% of the overall net value of production on the Prairies.

Another way of expressing the growing importance of the expansion taking place in the Province's economy, is to point out that the 7.2% of Canada's population which resides in this province is providing approximately 18% of the agricultural production and 16% of the mineral production in

Canada. While the net value of manufacturing production still amounts to only slightly more than 4% of the Canadian total, it is worthy of note that it has increased by about 2½ times between 1950 and 1958, whereas during that period, the Canadian total has only increased to approximately 1½ times its former value.

In view of the foregoing, it is not surprising that, during the last decade, outward signs of prosperity - paved and gravelled roads, vehicle registrations, use of electric power, etc., - have all shown increases well above the average Canadian rate.

The K.W.H. generated per capita - another good indicator - continues to increase. During the year, Alberta's population increased at about the usual rate and the K.W.H. generated per capita increased from 2611 to 2753. Ten years ago, in 1952, this per capita figure was 1250, so that the average person in Alberta is now using nearly two and one-half times as much electricity as he did ten years ago.

The increase in the use of electricity in Alberta during the past year is indicated by the following short summary. The figures compiled in it and throughout this report are confined to the Electric Utility Industry and are comparable to those presented by the Dominion Bureau of Statistics under the category of "Utilities".

K.W.H. Generated. The increase in K.W.H. generated over that of the previous year was 9.4%. Thermal plants generated 74.6% of the K.W.H. produced. Of this, internal combustion plants accounted for about the same proportion (2.8%) as they did during the previous year. This power, of course, is mainly that generated by Northland Utilities Limited and Canadian Utilities Limited in the Peace River country and includes the power generated by gas turbines at Valleyview.

Peak Load. The peak load for the Province has increased 3.7% over what it was in 1961. That this increase is so small is due to the very mild fall. If the weather had been normally severe, it is probable that the increase would have been of the order of 9%. The following figures are an estimate of the actual coincident peak for the Province:

System	Estimated Peak Load K.W., 1962
Interconnected system, including Athabasca, but less East Kootenay Power Co.	812,400
East Kootenay Power Co.	3,640
Peace River interconnected system (Includes N.U.L. and C.U.L.)	23,760
Canadian Utilities' Isolated Plants	850
Northland Utilities' Isolated Plants	2,565
	843,215
say,	843,000

Transmission lines in the Province increased by 831 miles to a total of 14,577, which includes 3,086 miles of Company-owned farm lines. Distribution line mileage increased 498 miles to 5,807. The total mileage of all farm lines increased by 1,352 miles, so that the total farm mileage at the end of 1962 was 42,479. The total mileage of all power lines in the Province at the end of December, 1962, was 59,777.

The figures in Tables 1 to 8, which follow, are comparisons with the other Prairie Provinces and with Canada as a whole.

Table No. 1 shows the capacity in M.W. of the Utility Electric Stations in Canada for the past several years.

TABLE NO. 1

Capacity of Utility Electric Stations
M.W.

Year	Alberta	Canada	Saskatchewan	Manitoba
1950	208	8,734	234	445
1951	280	9,724	272	457
1952	288	10,613	322	542
1953	372	11,687	347	561
1954	504	12,479	356	561
1955	477	13,422	394	637
1956	572	* 12,463	415	637
1957	596	13,444	452	644
1958	718	14,758	529	741
1959	750	16,937	670	757
1960	917	18,419	737	1,024
1961	947			
1962	1,092			

Increase during the 10 year period ended 1960

Year	Alberta	Canada	Saskatchewan	Manitoba
1960	917	18,419	737	1,024
1950	208	8,734	234	445
Increase:	709	9,685	503	579
Percent Increase:	341%	111%	215%	130%

Increase Alberta: 1952 to 1962 - 279%

* In 1956, the D.B.S. changed its classification of statistics from Central Stations to Utilities.

Except for Alberta, the figures from 1950 to 1960 have been taken from D.B.S. publications. Alberta figures are those compiled by the Alberta Power Commission.

Table No. 2 shows the growth of K.W.H. generated net during the past several years.

TABLE NO. 2

Electric Energy Generated by Utilities
(Millions of K.W.H.)

Year	Alberta	Canada	Saskatchewan	Manitoba
1951	984	48,055	968	2,562
1952	1,146	51,841	1,068	2,696
1953	1,298	53,340	1,161	2,791
1954	1,485	55,334	1,280	2,937
1955	1,707	61,642	1,409	3,102
1956	1,996	68,845	1,537	3,331
1957	2,249	71,522	1,678	3,341
1958	2,474	75,953	1,809	3,214
1959	2,830	83,048	1,998	3,598
1960	3,131	88,956	2,182	3,757
1961	3,446	89,056	2,422	3,790
1962	3,772			

Increase during the 10 year period ended 1961

Year	Alberta	Canada	Saskatchewan	Manitoba
1961	3,446	89,056	2,422	3,790
1951	984	48,055	968	2,562
Increase:	2,462	41,001	1,454	1,228
Percent Increase:	250%	85%	150%	48%

Increase Alberta: 1952 to 1962 - 230%

The figures from 1951 to 1961 have been taken from D.B.S. publications. 1962 figures for Alberta are those compiled by the Alberta Power Commission.

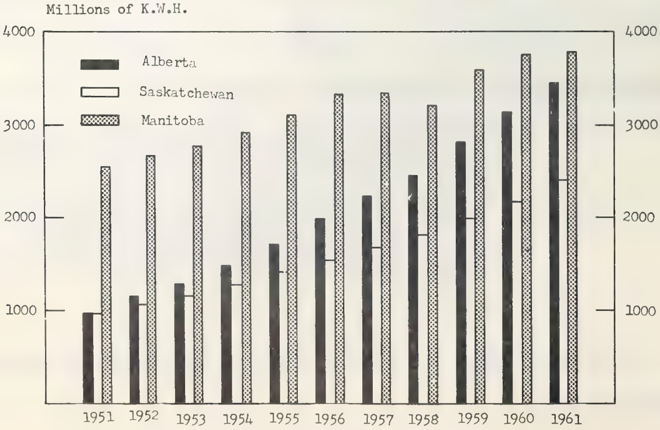


CHART 1 ELECTRIC ENERGY GENERATED BY UTILITIES
PRAIRIE PROVINCES 1951 to 1961

TABLE NO. 3

Annual K.W.H. used per Domestic and Farm Customer

Year	Alberta	Canada	Saskatchewan	Manitoba
1950	1,224	2,413	1,353	4,783
1951	1,384	2,617	1,531	4,813
1952	1,473	2,809	1,677	4,868
1953	1,624	3,008	1,878	4,960
1954	1,865	3,271	2,072	5,229
1955	1,975	3,500	2,483	5,420
1956	2,256	3,740	2,361	5,636
1957	2,373	3,960	2,577	5,895
1958	2,532	4,128	2,696	6,113
1959	2,859	4,338	2,974	5,993
1960	2,989	4,489	2,996	6,184

These are Dominion Bureau of Statistics figures.

Increase during the 10 year period ended 1960

Year	Alberta	Canada	Saskatchewan	Manitoba
1960	2,989	4,489	2,996	6,184
1950	1,224	2,413	1,353	4,783
Increase:	1,765	2,076	1,643	1,401
Percent Increase:	144%	86%	121%	29%

Manitoba has an exceptionally high figure for K.W.H. used per domestic customer. This is partly due to the fact that one city alone - Winnipeg - contains a large percentage of the total population of the Province. It is also due to the fact that the cost of developing the water power sites adjacent to Winnipeg was possibly the cheapest in the world. This provided cheap power for the people of the City of Winnipeg, and since fuel was expensive there, electricity was used extensively for cooking and heating, and a happy combination of low rates produced high use, and vice versa.

The figures for Canada for K.W.H. used per year per domestic and farm customer is high because it takes into account the high consumption in Manitoba and Ontario.

TABLE NO. 4

Costs in Cents per K.W.H. Domestic and Farm Customers

Year	Alberta	Canada	Saskatchewan	Manitoba
1950	3.28	1.61	3.80	1.15
1951	3.16	1.65	3.70	1.18
1952	3.06	1.65	3.59	1.21
1953	2.91	1.70	3.52	1.23
1954	2.75	1.69	3.39	1.25
1955	2.64	1.66	2.93	1.18
1956	2.51	1.64	3.17	1.15
1957	2.44	1.62	3.11	1.13
1958	2.40	1.61	3.08	1.06
1959	2.28	1.61	3.01	1.15
1960	2.22	1.60	2.91	1.16

These are Dominion Bureau of Statistics figures.

Change during the ten-year period ending 1960

Year	Alberta	Canada	Saskatchewan	Manitoba
1950	3.28	1.61	3.80	1.15
1960	2.22	1.60	2.91	1.16
Inc. or Dec.	1.06	.01	.89	.01
	Decrease 32%	Decrease 1%	Decrease 23%	Increase 1%

TABLE NO. 5

Total Number of Customers of Utilities
(thousands)

Year	Alberta	Canada	Saskatchewan	Manitoba
1950	172	3,270	121	179
1951	186	3,440	127	194
1952	200	3,621	139	209
1953	221	3,817	151	221
1954	239	4,002	170	234
1955	267	4,225	185	243
1956	276	4,412	206	254
1957	295	4,597	220	258
1958	316	4,798	230	267
1959	339	5,009	241	282
1960	355	5,178	256	287
1961	* 367			
1962	* 382			

Increase during the ten-year period ending 1960

Year	Alberta	Canada	Saskatchewan	Manitoba
1960	355	5,178	256	287
1950	172	3,270	121	179
Increase:	183	1,908	135	108
Percent Increase:	106%	58%	112%	60%

Increase Alberta: 1952 to 1962 - 91%

* Figures marked thus are Alberta Power Commission figures, and others are from the Dominion Bureau of Statistics.

TABLE NO. 6

Number of Farms Served by Utilities as at December 31 each year

Year	* Alberta	Saskatchewan	Manitoba
1951	13,479	5,594	23,777
1952	18,055	8,591	29,623
1953	24,181	13,850	33,601
1954	30,504	21,287	37,422
1955	34,768	28,993	38,277
1956	37,658	38,495	38,091
1957	41,130	44,955	38,120
1958	45,848	50,813	38,700
1959	49,923	55,424	39,027
1960	53,151	59,384	39,162
1961	55,768	* 60,000	* 39,200
1962	58,593		

TABLE NO. 7

Consumption in K.W.H. per Farm per Year

Year	Alberta	Canada	Saskatchewan	Manitoba
1950	2,250	1,932	880	2,359
1951	2,461	2,085	1,266	2,475
1952	2,747	2,228	1,527	2,666
1953	2,604	2,420	1,915	2,943
1954	2,958	2,672	2,053	3,541
1955	2,882	2,803	2,054	3,564
1956	3,255	3,060	2,217	3,911
1957	3,297	3,415	2,490	4,238
1958	3,566	3,686	2,670	4,586
1959	3,956	4,086	3,180	5,366
1960	4,029	4,345	3,313	5,523
1961	* 4,322			
1962	* 4,769			

* Figures marked thus are Alberta Power Commission figures, and others are from the Dominion Bureau of Statistics.

TABLE NO. 8

Total Pole Line Mileage
(Includes transmission, distribution and rural lines)

Year	Alberta	Canada	Saskatchewan	Manitoba
1950	12,108	151,726	5,712	20,472
1951	15,125	170,582	9,574	24,439
1952	20,188	190,316	13,858	28,514
1953	26,211	213,176	20,899	32,237
1954	* 31,736	228,158	26,177	33,615
1955	* 36,233	243,773	33,755	33,219
1956	* 39,430	265,389	44,516	34,232
1957	* 43,404	285,306	54,700	34,317
1958	* 48,721	311,511	68,852	35,111
1959	* 52,368	310,840	64,495	35,302
1960	* 54,821	320,618	66,856	35,457
1961	* 57,113			
1962	* 59,777			

* Figures marked thus are Alberta Power Commission figures; the others are from the Dominion Bureau of Statistics.

TABLE NO. 9

K.W.H. Generated per Capita in Alberta

Year	Population	K.W.H. Generated x 10^6	K.W.H. Generated/Capita
1952	970,000	1,213	1,250
1953	1,002,000	1,341	1,338
1954	1,039,000	1,499	1,443
1955	1,066,000	1,728	1,621
1956	1,123,000	2,019	1,798
1957	1,160,000	2,243	1,934
1958	1,201,000	2,474	2,060
1959	1,243,000	2,830	2,277
1960	1,283,000	3,126	2,436
1961	1,320,000	3,446	2,611
1962	1,370,000	3,772	2,753

PRESENT STATUS OF THE INDUSTRY

The Statistics for the Electric Utilities for the year 1962 follow: Some of the minor figures are estimates only, due to the fact that the report has to be prepared before the various utilities have completed their statistics for the past year. These minor estimates will not be in error by more than 1% or 2%, so that the error in the whole will be negligible. Wherever an estimate has been used, it is marked "est".

Tables No. 10 to 20 deal with plant capacity, peak load and K.W.H. generated. They break up the figures to show what was generated by hydro, steam and internal combustion engines, and also to show the proportions generated by the publicly-owned and the privately-owned plants. Table No. 16 gives further details of the generating plants and their output. It will be noted that it is divided into three groups, A, B and C.

The largest, Group A, contains those power plants which are connected by transmission lines, so that we speak of them as being in the interconnected system. This group which covers most of the Province, includes towns served by Calgary Power Ltd., Canadian Utilities Limited (excluding areas shown under B. and C.), the Athabasca system of Northland Utilities Limited, the Cities of Edmonton, Calgary, Lethbridge, Red Deer and Medicine Hat, and the Towns of Ponoka, Fort Macleod and Cardston. Some of these do not generate their own power but purchase it from Calgary Power Ltd., and retail it to their inhabitants. This group includes the hydro plants of Calgary Power Ltd., which are rated as follows:

TABLE NO. 10

Plant		Capacity	
		H.P.	K.W.
Pocaterra	-	18,400	15,000
Interlakes	-	6,900	5,000
Rundle	-	63,000	47,000
Spray	-	124,000	100,000
Three Sisters	-	3,600	3,000
Cascade	-	46,000	36,000
Horseshoe	-	20,000	14,000
Kananaskis	-	24,000	19,000
Barrier	-	16,000	13,000
Ghost	-	67,450	51,000
Bearspaw	-	22,000	17,000
		411,350	320,000

The rating of the major thermal plants in Groups A. and B. is as follows:

TABLE NO. 11

Plant	Fuel	K.W. Rating
Calgary Power Ltd.		
Wabamun	Gas	144,000
Wabamun	Coal	150,000
Canadian Utilities Ltd.		
Battle River	Coal	32,000
Drumheller	Coal	15,000
* Vermilion	Gas	39,000
* Sturgeon	Gas	18,500
** Fairview	Gas	11,400
* City of Edmonton	Gas	260,000
* City of Lethbridge	Gas	33,500
City of Medicine Hat	Gas	43,400
East Kootenay Power Co.	Coal	12,500

* Includes Gas Turbines.

** Jointly owned by Canadian Utilities Limited and Northland Utilities Limited.

Group B. takes in the Peace River country and includes the territory served by Canadian Utilities Limited and Northland Utilities Limited. The systems of these companies are tied together by transmission lines from Fairview to Rycroft and from Valleyview to High Prairie, so that now the whole of the Peace River country is one interconnected system.

Group C. includes various isolated towns served either by Northland Utilities Limited or by Canadian Utilities Limited.

In 1962, the interconnected system shown as Group A., had a combined capacity of 1,051,200 K.W., and generated 3,665,513,000 K.W.H. It served 363,519 customers. This system accounts for 96% of the generating capacity of the Province, 97% of the K.W.H. generated, and 95% of the number of customers.

The Peace River country interconnected system shown as Group B., had a combined capacity of 34,100 K.W. and generated 92,542,000 K.W.H., and served 16,315 customers.

TABLE NO. 12

The following Companies or Municipalities provide Central Station Electrical Service in the Province. This table gives preliminary data as to their plant capacity, their loads, and the K.W.H. they generated net in 1962.

Privately Owned

Name of Company	Plant Capacity Dec. 31/62. K.W.	Peak Load (KW) on plants during 1962	K.W.H. Gen. Net - 1962 (thousands)
1.			
Calgary Power Ltd.	614,000	508,400	2,214,817
Canadian Utilities Ltd.	111,325 (1)	81,700	324,704 (2)
Northland Utilities Ltd.	17,685	10,410	39,877
East Kootenay Power Co.Ltd.(3)	12,500	11,000	5,941
1. Total:	755,510		2,585,339

Publicly Owned

Name of Municipality			
2.			
City of Edmonton	260,000	199,000	785,767
City of Lethbridge	33,500	18,900	81,305
City of Medicine Hat	43,400	40,100	319,374 (4)
2. Total:	336,900		1,186,446
Plus 1. Total:	755,510		2,585,339
GRAND TOTAL:	1,092,410		3,771,785

(1) Includes one 1,200 K.W. unit at Fairview.

(2) Includes some K.W.H. generated at Fairview.

(3) The East Kootenay Power plant is located at Sentinel some two or three miles inside the Alberta border. While this energy is generated in Alberta, most of it is exported to British Columbia.

(4) Includes 219,090,400 K.W.H. sold to Calgary Power Ltd.

TABLE NO. 13

The following is a re-arrangement of the figures in Table 12, so as to break them down into power generated by hydro, steam and internal combustion plants. Some of the thermal plants include gas turbines.

Name of Company	Plant Capacity December 31/62 K.W.	Peak Load (KW) on plants during 1962	K.W.H. Gen. Net - 1962 (thousands)
HYDRO			
Calgary Power Ltd.	320,000	314,800	950,985
Northland Utilities Ltd.	1,432	900	5,201
Total Hydro:	321,432		956,186
STEAM			
Calgary Power Ltd.	294,000	279,300	1,263,820
Canadian Utilities Ltd. (5)	86,000	66,600	255,220
East Kootenay Power Co.Ltd.(3)	12,500	11,000	5,941
City of Edmonton (5)	260,000	199,000	785,767
City of Lethbridge (5)	33,500	18,900	81,305
City of Medicine Hat	43,400	40,100	319,374 (4)
Total Steam:	729,400		2,711,427
INTERNAL COMBUSTION			
Calgary Power Ltd.	-	-	12
Canadian Utilities Ltd. (5)	25,325 (1)	15,100	69,484 (2)
Northland Utilities Ltd.	16,253	9,510	34,676
Total Internal Combustion:	41,578		104,172
GRAND TOTAL:	1,092,410		3,771,785

(1) Includes 1,200 K.W. unit at Fairview

(2) Includes some K.W.H. generated at Fairview

(3) See footnote (3) on Table No. 12

(4) Includes 219,090,400 K.W.H. sold to Calgary Power Ltd.

(5) Includes Gas Turbines.

TABLE NO. 14

The following is a breakdown of the fuel used in larger thermal plants during 1961

	Gas M.C.F.	Oil Gallons	Coal Tons
Calgary Power Ltd.			
Wabamun	11,168,051		
Canadian Utilities Ltd.			
Drumheller			69,009
Battle River			153,959
Vermilion	85,398		
Valleyview	1,020,660		
Grande Prairie	7,873	2,112	
Miscellaneous	4,204	232,217	
Northland Utilities Ltd.			
Fairview	239,313	5,732	
Miscellaneous	83,143	163,973	
City of Edmonton	9,311,291	2,650,068	
City of Lethbridge	1,496,625		
City of Medicine Hat	5,121,800		
	28,538,358	3,054,102	222,968

TABLE NO. 15

The following table may be of interest as showing the relative position of steam, hydro and internal combustion in the Province, December 31, 1962.

Method of Generation	% of Power Generated	% of Capacity
Hydro	25.4	29.4
Steam & Gas Turbine	71.8	66.8
Internal Combustion	2.8	3.8
	100	100
Publicly owned	31.5	30.8
Privately owned	68.5	69.2
	100	100

CHART 2 GENERATION OF ELECTRIC POWER IN ALBERTA BY SOURCES OF ENERGY, 1960

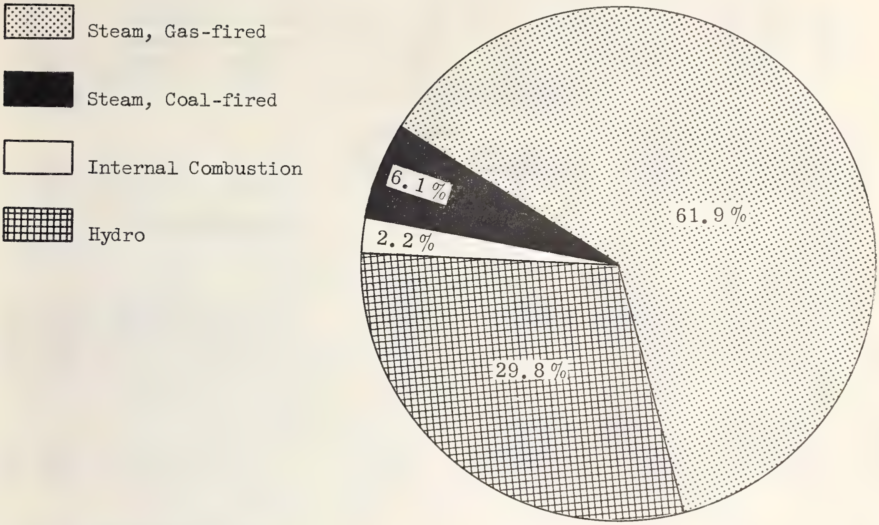


CHART 3 DISTRIBUTION OF ELECTRIC POWER IN ALBERTA BY TYPES OF CUSTOMERS, 1960

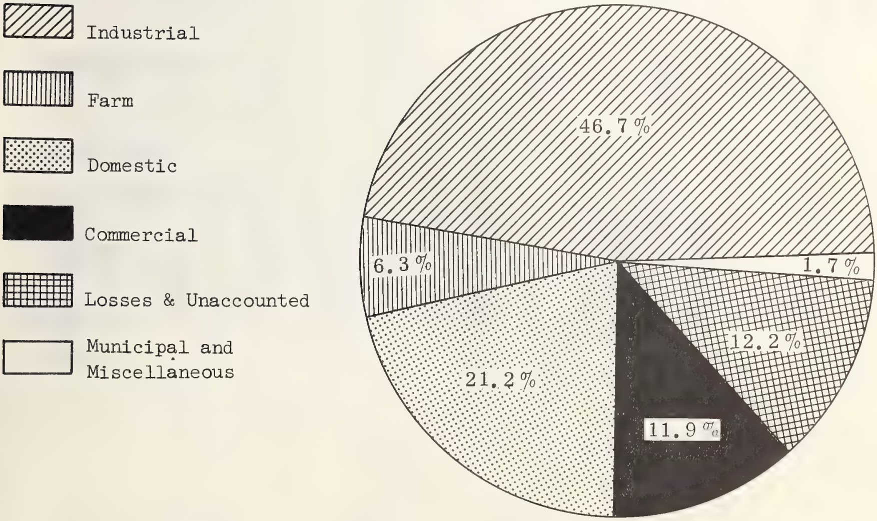


TABLE NO. 16

SUMMARY OF GENERATING PLANTS IN ALBERTA

AS AT DECEMBER 31, 1962

Owner	Hydro		Steam		Internal Combustion	
	K.W. Rating	K.W.H. generated, 1962 (thousands)	K.W. Rating	K.W.H. generated, 1962 (thousands)	K.W. Rating	K.W.H. generated, 1962 (thousands)
A. Within the interconnected system						
Calgary Power Ltd. (only)	320,000	950,985	294,000	1,263,820	—	12
Canadian Utilities Ltd.			86,000 (1)	255,220 (1)		
East Kootenay Power Co. Ltd.			12,500	5,941		
City of Edmonton			260,000 (1)	785,767 (1)		
City of Lethbridge			33,500 (1)	81,305 (1)		
Athabasca System (N.U.L.)					1,800	3,089
City of Medicine Hat			43,400	319,374		
TOTAL GROUP A:	320,000	950,985	729,400	2,711,427	1,800	3,101
B. Peace River Interconnected System						
Canadian Utilities Ltd.					23,900 (1)	66,868 (1)
Northland Utilities Ltd.					10,200	25,674
TOTAL GROUP B:					34,100	92,542
C. Isolated Systems						
Northland Utilities Ltd.						
Jasper	1,432	5,201			2,190	2,130
Lac La Biche					1,250	2,364
Misc. Small Plants					813	1,419
Canadian Utilities Ltd.						
McMurray					575	1,399
Smith					450	609
Misc. Small Plants					400	608
TOTAL GROUP C:	1,432	5,201			5,678	8,529
TOTAL ALL GROUPS:	321,432	956,186	729,400	2,711,427	41,578	104,172
		GRAND TOTAL:	1,092,410	3,771,785		

(1) Includes gas turbines.

TABLE NO. 17

Total Circuit Miles of Transmission Lines in the Province by Regional Groups as at December 31, 1962. This includes Company-owned Farm Lines, but does not include the Co-operative-owned Farm Lines.

	VOLTAGE				
	2,300 to 22,000 V	33,000 V	50,000 to 72,000 V	132,000V & greater	Total
A. Within the Interconnected System					
Calgary Power Ltd.	7,807	29	1,208	1,543	10,587
Canadian Utilities Ltd.	1,679	217	583	143	2,627
City of Medicine Hat	34				34
East Kootenay Power Co. Ltd.	33		50		83
Athabasca System	67				67
Total Group A:	9,620	246	1,846	1,686	13,398
B. Systems within the Peace River country					
Canadian Utilities Ltd.	361	30	215		606
Northland Utilities Ltd.	371		152		523
Total Group B:	732	30	367		1,129
C. Isolated Towns					
Northland Utilities Ltd.					
Jasper	29				29
Lac La Biche	15				15
Canadian Utilities Ltd.					
McMurray	6				6
Total Group C:	50				50
TOTAL ALL GROUPS	10,402	276	2,213	1,686	14,577

TABLE NO. 18

SUMMARY OF DISTRIBUTION SYSTEMS IN ALBERTA

As at December 31, 1962.

	Total Number of Customers Served (Includes Rurals)	K.W.H. Sold (Less Sales to other Co's.) (thousands) (Includes Rurals)	Circuit Miles of Line (Excludes Rurals)
A. Within the Interconnected System			
Calgary Power Ltd.	120,750	1,328,000	1,962
Canadian Utilities Ltd.	38,364	216,199	660
East Kootenay Power Co. Ltd. (1)	1,215	15,006	32
City of Edmonton	82,824	683,692	804
City of Calgary	89,264	745,150	1,289
City of Lethbridge	11,652	74,242	135
City of Medicine Hat	8,564	100,283	113
City of Red Deer	6,136	43,364	114
Town of Cardston	1,000	3,578	32
Town of Fort Macleod	943	3,552	21
Town of Ponoka	1,480	7,346	25
Athabasca System	1,327	4,892	40
TOTAL GROUP A:	363,519	3,225,304	5,227
B. Systems Within the Peace River			
Canadian Utilities Ltd.	8,815	49,200	299
Northland Utilities Ltd., including High Prairie, McLennan, Valleyview and Manning	7,500	28,294	180
TOTAL GROUP B:	16,315	77,494	479
C. Isolated Towns			
Northland Utilities Ltd.			
Jasper	811	6,094	28
Lac La Biche	539	2,170	13
Misc. Small Plants	196	1,031	27
Canadian Utilities Ltd.			
McMurray	329	1,299	10
Smith	95	517	3
Misc. Small Plants	148	569	20
TOTAL GROUP C:	2,118	11,680	101
GRAND TOTAL:	381,952	3,314,478	5,807

(1) Includes Towns of Coleman, Frank, Cowley, etc.

TABLE NO. 19

SUMMARY OF RURAL ELECTRIFICATION SYSTEMS IN ALBERTA
As at December 31, 1962.

	Number Farmers Served	Number Non-Farmers Served	Total Number Customers	Circuit Miles of Line
A. **Within the Interconnected System**				
Calgary Power Ltd.				
Experimental Areas and Individual Rurals (1)	4,227	970	5,197	2,469
R.E.A.s	36,436	6,412	42,848	25,003
Canadian Utilities Limited				
Experimental Areas and Individual Rurals (1)	765	110	875	412
R.E.A.s	11,244	921	12,165	9,800
Northland Utilities Limited - Athabasca System				
Experimental Areas and Individual Rurals (1)	4		4	2
R.E.A.s	650	45	695	509
East Kootenay Power Co. Ltd.				
R.E.A.s and Lundbreck Co-op.	149	51	200	149
Adjacent to Cities, etc. (1)	254		254	96
TOTAL GROUP A:	53,729	8,509	62,238	38,440
B. **Peace River Country**				
Canadian Utilities Limited				
Experimental Areas and Individual Rurals (1)	125	99	224	82
R.E.A.s	2,436	140	2,576	1,924
Northland Utilities Limited				
Experimental Areas and Individual Rurals (1)	125		125	24
R.E.A.s	2,062	195	2,257	1,874
TOTAL GROUP B:	4,748	434	5,182	3,904
C. Isolated Towns Served by Northland Utilities Limited				
Company-owned Rurals (1)	1		1	1
R.E.A.s	115	5	120	134
TOTAL GROUP C:	116	5	121	135
GRAND TOTAL:	58,593	8,948	67,541	42,479

(1) The lines to serve these farms are the property of the Power Companies. This mileage is also included in the table showing transmission lines under the heading of 2,300 to 22,000 volt lines, etc.

TABLE NO. 20

DATA RE. CENTRAL STATIONS IN ALBERTA BY REGIONAL GROUPS
As at December 31, 1962.

	Group A	Group B	Group C	Total
Plants				
K.W. Rating	1,051,200	34,100	7,110	1,092,410
K.W.H. Generated (Thousands)	3,665,513	92,542	13,730	3,771,785
Transmission				
Miles of Line	13,398	1,129	50	14,577
Distribution				
Number of customers	363,519	16,315	2,118	381,952
K.W.H. sold (Thousands)	3,225,304	77,494	11,680	3,314,478
Miles of Line	5,227	479	101	5,807
Rural				
Number of farms (1)	53,729	4,748	116	58,593
Number of non-farms (1)	8,509	434	5	8,948
Miles of farm line (2)	38,440	3,904	135	42,479
Miles of R.E.A. line (3)	35,461	3,798	134	39,393

(1) Included in Number of Customers shown under Distribution.

(2) Partly included in Miles of Transmission Lines.

(3) Not included in Miles of Line shown under Distribution or Transmission Lines.

The following is a more detailed summary of the additions to generating capacity, transmission line facilities, etc., during the year 1962:

Calgary Power Ltd.

(1) Changes in Plant Capacity

Work is continuing on the Brazeau Storage and Power Development. The initial development consists of a storage reservoir of some 350,000 acre-feet capacity which was completed in the fall of 1962 and a powerhouse containing an initial unit of 150,000 kilowatts scheduled for operation in the fall of 1964.

Work was completed in the fall of 1962 on an extension to the Wabamun Steam Plant which added a 150,000 kilowatt unit to the Company's system.

(2) Additional Transmission Lines

During the year 1962, Calgary Power Ltd. built the following Transmission lines:

Sarcee to Wabamun	240 KV	184.46	miles
Wabamun to 38S	230 KV	55	miles (now operates at 138 KV)
Brazeau Dam	138 KV	10.2	miles (now operates at 22 KV)
Redwater to Boyle	69 KV	34	miles

New substations and substation changes during the year 1962 were as follows:

The most significant additions were the terminal substations for the Wabamun-Calgary 240 KV transmission line.

At Wabamun, this included a 180 MVA, 240/16.0 KV generator transformer, a 150 MVA throughput, 240/138 KV OLTC auto transformer, a 14 MVA 138/4.16 KV station service transformer, together with 240 KV and 138 KV buswork and circuit breakers.

At Calgary (Sarcee), a new terminal station was established, including a 240/138 KV auto transformer having a forced air cooled throughput rating of 240 MVA. A 240 KV circuit breaker for the line to Wabamun, as well as 138 KV breakers, were installed. This station is remote controlled over radio supervisory from the Company's Control Centre at Seebe.

A 5,000 KVA, 69/23 KV substation was constructed at Whitecourt to handle the increased loads in this area which had been fed from the Mayerthorpe substation.

At Boyle, a 5,000 KVA, 69/23 KV substation was constructed to enable larger load transfers to Athabasca and Lac La Biche areas. Conversion of the Redwater-Boyle line to 69 KV operation necessitated the installation of a 69 KV circuit breaker at Redwater.

Load growth at Jasper Place necessitated the construction of a 15,000 KVA, 69/23 KV substation, using transformers released from the Company's Calder substation. At Calder, a 20,000 KVA, 138/23 KV transformer was installed, taking advantage of a new Wabamun-Edmonton line commissioned in 1962.

A 1,000 KVA, 69/2.3 KV substation was constructed at Whitecourt to supply the Peace River Oil Pipeline pumping station.

The transformer capacity at the Stirling substation was increased from 2,500 KVA to 5,000 KVA, 69/23 KV.

A second 10,000 KVA, 69/23 KV transformer was installed at the Drayton Valley substation.

(3) During the year, the following hamlets were added to the system of Calgary Power Ltd.

Antler Lake
Half Moon Lake
Kananaskis Lower Lakes Subdivision
Lac Des Arcs (near Exshaw)
Little Bow Park Subdivision
Val Quentin Beach (on Lac St. Anne)
Mattwa Bay (on Lake Wabamun)
Beauvais Lake Subdivision
Three Sisters Subdivision
Alto-View Subdivision (near Red Deer)

Municipal street lighting service showed an increase of over 1300 mercury vapour fixtures and 160 incandescent fixtures during 1962. Calgary Power Ltd. now supplies a total of 11,645 mercury and incandescent street lights.

(4) Service to Oilfields, New Industries, etc.

The main activity this year in new service to oilfields was in the Pembina, Willesden Green and Carstairs fields. Although a total of 684 new oilfield services representing nearly 8,500 HP (for oilwell pumps, gathering systems, water systems and miscellaneous) were connected during the year, 377 oilfield services representing over 5,000 HP were disconnected, these services being no longer required. To date, the Innisfail oilfield distribution system has been completely salvaged, and about 70% of the system in the Joffre oilfield. Of over 6,500 services now being supplied, 4,324 are for oilwell pumps, 889 for gathering systems, 490 for water pumping and injection systems, and over 300 miscellaneous services.

The total load of the oil and gas industry, including oilfield extensions, pump stations, gas plants, oil refineries and miscellaneous, increased over 15% during 1962, with the consumption of gas plants increasing nearly 60%. Gas processing plants were connected at Parkland and Carson Lake, Cochrane and near Edmonton during the year, and these services, together with full operation of plants connected in the latter part of 1961, account for this load increase.

Three relatively large oil pump stations, near Rimbey, Whitecourt and Windfall, were connected, a main line oil pump station was reconnected at Niton, and arrangements completed to serve a 4,000 HP booster station near Hardisty.

About a 2,000 HP load increase at the metals refinery at Fort Saskatchewan was experienced, and arrangements were made to serve a 2,500 KVA pipe mill load at Camrose. A metal foundry was connected in the Fort Macleod Industrial Subdivision with a load of nearly 900 KVA.

Many new services were provided of 50 HP and over to feed mills, concrete plants, water treatment and pumping plants and a number of light manufacturing plants. There was a significant increase in interest shown in farm irrigation services, and individual installations of up to 50 HP were connected. Additional artificial ice plants, arenas and curling rinks were added to the system, together with 5 large schools and hospitals.

Arrangements for extension of the Company's system to the Lake Louise area were completed. Certain rural services were transferred from the Salisbury and Clover Bar Co-op systems near Edmonton to the Company's system, and the sale of a small rural distribution system to the City of Red Deer was completed during the year.

Canadian Utilities, Limited

(1) The new 30,000 K.W. gas turbine at Vermilion was commissioned early in 1962, providing the company with a third low cost per kilowatt peaking unit. Later in the year, work was started on the second 32,000 K.W. steam turbine at Battle River, which will be commissioned in 1964. By year end, building extension and concrete bases were nearly completed. Two obsolete steam turbine generators at Drumheller were dismantled; a 1,500 K.W. unit was donated to the U. of A. Technical School at Calgary and a 2,500 K.W. unit was donated to the new Edmonton Technical School.

(2) Transmission Lines and Substations

During 1962, expenditures on transmission lines and substations were approximately $100,000 and $200,000 respectively.

(a) Transmission Lines.

The Battle River to Stettler line was reconductored during 1962 in the Drumheller District and similar work was done on one circuit between the Mercer Hill substation and Grande Prairie. An extension was also built to supply a new water pumping installation for the City of Grande Prairie at the Wapiti River, approximately ten miles south of the City.

(b) Substations.

A 69 K.V. substation was built at Botha and improvements were made to several existing substations. Additions were made at Bonnyville, Coronation and impedance relaying added to the tie breaker at Vegreville and the Mercer Hill and Sturgeon Plant substations in the Grande Prairie District. The improved relaying was installed in the Grande Prairie District to allow operation of the 69 K.V. loop through the combined Canadian and Northland systems. This is expected to improve the reliability of service at 69 K.V. in that area. A 69 K.V. substation was also installed to supply the new C.B.C.- T.V. station near Grande Prairie which began operation in December.

(3) Towns and Villages added to the Company's system in 1962.

Huallen
Tulliby Lake

Branch resorts: Little Miami
Sturgeon Resort

(4) Service to Oilfields, New Industries, etc.

During 1962, the company expenditures totalled nearly $300,000 for oilfield extensions to provide service to 130 new oilfield customers. Of these, 18 were in the new Twining Oilfield extension completed early in the year, 74 were connected in the Swan Hills-Virginia Hills area and 38 new customers were added in the Big Valley, Hamilton Lake, Stettler and other smaller oilfields. New street light installations and conversion to mercury vapour street lighting continued at a steady pace. Another large electrically-powered strip-mining shovel was connected in the Battle River coalfield.

Northland Utilities, Limited

(1) Changes in Plant Capacity

Construction on a new power plant north of Worsley was started in 1962. This plant will have an initial installed capacity of 1500 K.W., and will be used to feed the Northland Utilities Limited area from Hines Creek to Worsley, including rurals. It will also supply power to the new Shell Plant at Worsley.

At Jasper on the Astoria River Hydro Site, the penstock size was increased from 24" woodstave pipe to 36" steel pipe. This was completed early enough to allow operation of the hydro site in time for the summer peak, which occurs with the influx of tourists at this time of year. The increase in penstock size allows an additional 500 K.W. to be generated by the hydro plant.

(2) Additional Transmission Lines and Substations

A ten mile 25 K.V. tie line between the Lac La Biche distribution system and the Calgary Power line at Plamondon was completed in late November. The consumers in the Lac La Biche area are now connected to the Interconnected Provincial Grid System.

In the Peace River country, a new twelve mile 3 phase 25 K.V. line was built to serve the new Grouard Indian Vocational Training School, north of High Prairie. A three mile 25 K.V. 3 phase extension was also built to serve the grain elevators east of Manning on the first section of the Great Slave Railroad.

At Fairview, an increase of 5000 K.V.A. in transformer capacity was added at the Fairview Power Plant substation.

Additional control, protective relaying and related protective equipment was added at the Donnelly Corner, Nampa and Wagstaffe substations located on the Peace River 72 K.V. system. This now completely co-ordinates this system with that of Canadian Utilities Limited' corresponding system south of the Peace River.

City of Edmonton

Changes in Plant Capacity

No new units have been installed during the year but plans are going forward towards commissioning another 75,000 K.W. unit during 1963.

City of Lethbridge

Changes in Plant Capacity

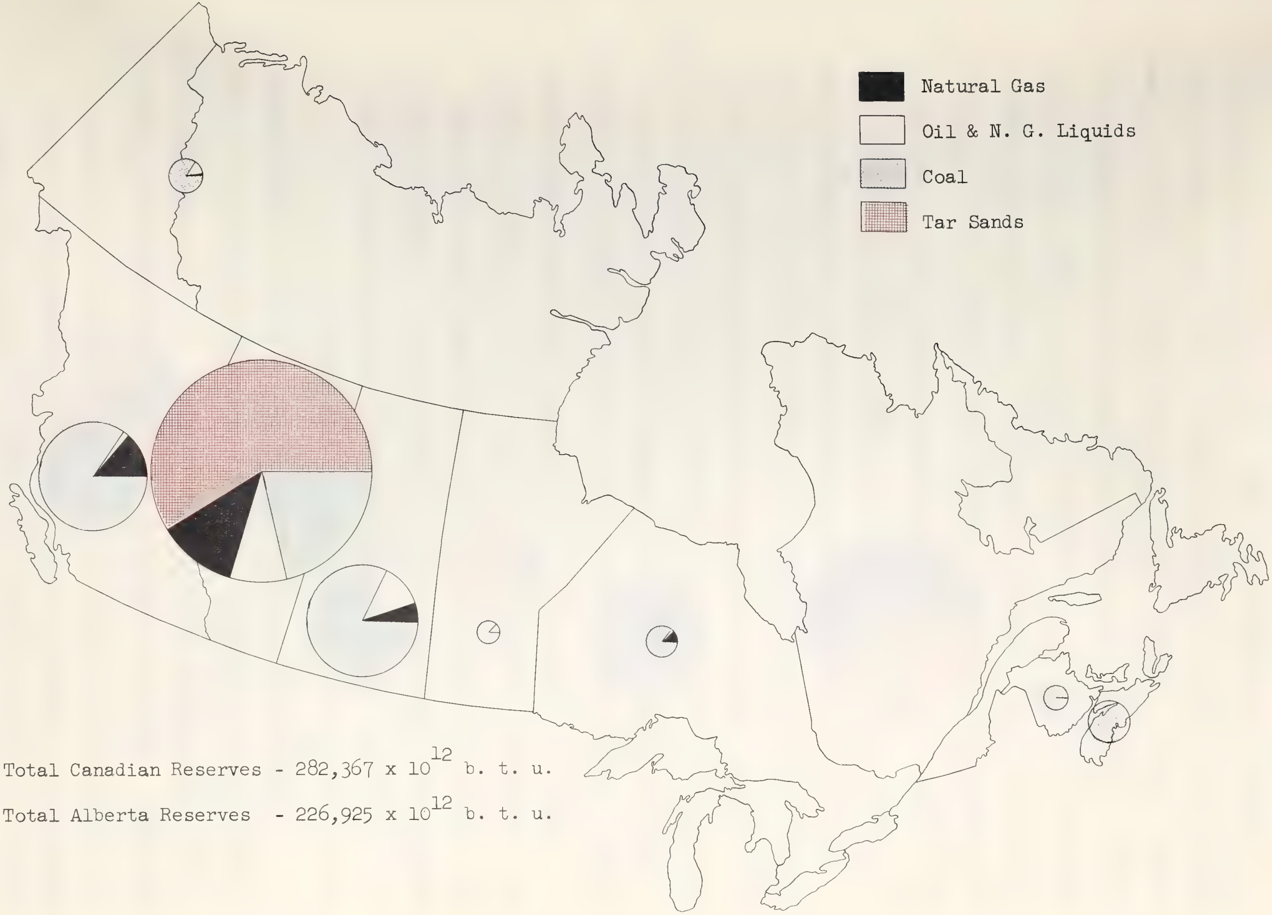
No changes have taken place during 1962.

In general, considerable substation and transmission capacity has been added during the year to keep pace with the remarkable growth of load in the main interconnected system and in the Peace River country. Considerable growth has been experienced in the oilfields in the Swan Hills and associated areas.

From its Valleyview plant, Canadian Utilities Limited supplies some light loads for some 60 miles south and east along the highway. Calgary Power Limited has built a 23 K.V. transmission line from Whitecourt to the Windfall gas field and for some 15 miles this follows Highway No. 43. The effect of these lines is a start towards closing the gap between the Peace River country and the main Provincial interconnected system. Moreover, a Canadian Utilities Limited 69/23 K.V. line runs east from its Valleyview plant into the Swan Hills. Similarly, Calgary Power Limited has a 69/23 K.V. line running north from Whitecourt to the Judy Creek area. These lines are too light to be capable of transferring any major quantity of power between the interconnected system in the Peace River country and that in the rest of the province, but they are steps in the right direction.

During the coming year, the tie between the two systems at Judy Creek will be strengthened to the mutual benefit of Canadian Utilities and Calgary Power Ltd. Furthermore, it is planned that a large interconnecting line will be built by the fall of 1964 to tie the Peace River country and the main interconnected system together; Calgary Power Ltd. will build a 132 K.V. line to some point near Two Creeks and Canadian Utilities will build from its Valleyview plant to that point. The next logical step in the development of power in the Peace River country might be the construction of one relatively large thermal station which, in conjunction with the tie line mentioned above, would supply the load in that area, leaving the existing plants to take care of peak load. One of the difficulties of building a large thermal station in the Peace River country has been the lack of coal in that area and the lack of a gas field large enough to provide fuel for such a plant for an extended period.

It appears now, however, that such a fuel supply is available at Worsley. Northland Utilities is already utilizing it and has built a small internal combustion engine plant there. Present plans are to enlarge this plant, possibly by installing a large gas turbine at Worsley in 1965 or 1966. This will likely be followed by a second turbine two or three years later. There is the possibility however, that other arrangements may be made before that time, because one alternative source of power might involve consideration of the proposed plant at Hudson Hope on the Peace River. Once this is completed and loaded, there should be some cheap power available. If all of the power used in the Alberta portion of the Peace River country, however, were to be drawn from this source, it would amount to one-half of one percent of the output of that plant. The unit cost of transmitting this small amount of power will be high, so that it will probably have little effect in reducing the cost of power in that area. There has been some discussion about building an E.H.V. line to send power into the Edmonton area from Hudson Hope, but it is doubtful if this would be economical.



Total Canadian Reserves - 282,367 x 10^{12} b. t. u.

Total Alberta Reserves - 226,925 x 10^{12} b. t. u.

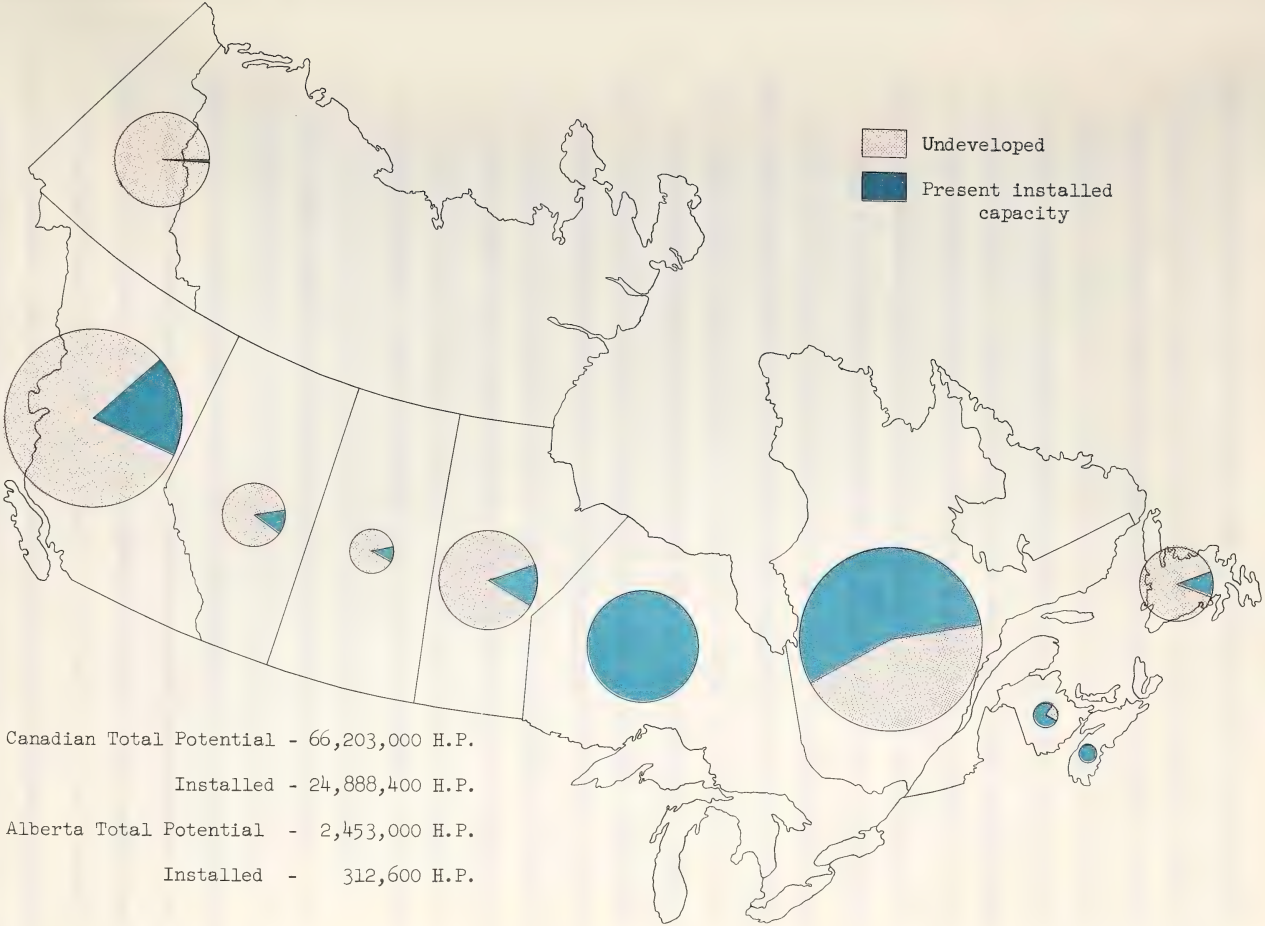
CHART 4 B.T.U. VALUES OF ESTIMATED RECOVERABLE RESERVES OF FOSSIL FUELS BY PROVINCE AND TYPE AS AT DECEMBER 31, 1961.

Alberta is so richly endowed with energy resources from which we can produce cheap power that, costwise, except for local areas, imported power cannot compete. The power situation in the province is, fortunately, most flexible and it is quite possible that factors such as the development of the Hines Creek Iron Ore, the Smoky River coals, the further discovery of oil and gas, or the feasibility of some other source of power, or indeed, development of the oil sands, might change the picture. As well as having two million H.P. of undeveloped hydro power, Alberta, with its oil, gas, oil sands and coal, has some 80% of all Canada's known fossil fuels.

Chart No. 4 gives a comparison of the amount of energy available from fuels in various parts of Canada. Over 95% of the energy available from fuels is concentrated in oil sands and oil, gas and coal reserves of the three western Provinces and over four-fifths of this potential is in Alberta. It will be noted that the energy available from the oil sands is one and one-half times as great as all the rest of Alberta's fossil fuels combined.

Chart No. 5 relates the H.P. of developed hydro power to the possible H.P. of undeveloped hydro power sites for the various Provinces of Canada. The size of these circles cannot be compared directly with those on the previous chart because they show H.P. and not K.W.H. In order to derive K.W.H. from them, it would be necessary to know how many hours in a year these plants could, or would, be run at full capacity.

Tabulations of potential power in Canada, of course, are not complete, as many unrecorded rapids and falls of undetermined capacity exist on rivers and streams throughout the country, particularly in the less explored northern districts. The figures available, are also somewhat misleading, because they do not take into account the power concentrations that are feasible on rivers and streams of gradual gradient where economic heads possibly may be created by the construction of dams. Furthermore, the estimates



Canadian Total Potential - 66,203,000 H.P.

Installed - 24,888,400 H.P.

Alberta Total Potential - 2,453,000 H.P.

Installed - 312,600 H.P.

CHART 5 AVAILABLE HORSEPOWER OF 24 HOUR POWER - 80% EFFICIENCY AND ORDINARY SIX MONTH FLOW AND HORSEPOWER ACTUALLY DEVELOPED AT DECEMBER 31, 1960. (1961 Canada Year Book) of power available in different Provinces do not include the power potential of major river diversions which have been investigated but not developed. In other words, in the case of Alberta, for instance, they do not take into account power which might be developed on the Athabasca and Peace River by the building of tremendous dams. Theoretically, it should be possible to place large dams on any of these rivers which would back the water up for possibly 30 or 40 miles to the base of a dam upstream. If this were done, then we could utilize all of the force available by taking advantage of the full drop in the river from its source to its mouth. Such utilization of these rivers may come in the future. If it does, Alberta's potential hydro power will be many times that shown in the chart and the same will apply, of course, to the water powers of the other Provinces. The building of dams and the creation of reservoirs of that magnitude, however, must await the need of large blocks of power - blocks which are much greater than we can forecast for several years to come. If at such a time we could generate a tremendous amount of power, that power could be sold very cheaply, providing there was a market for it, but, generally speaking, if such dams were to be attempted today when there is a market for only a limited amount of power, the cost per K.W.H. for power so generated would be exorbitant.

Looking into the future, then, these dams will be built some day. Whenever it is economical to build a hydro plant as compared to constructing a thermal one, the hydro plant should be given priority because the energy so reclaimed from falling water will be a continuing source of energy year after year, whereas, although we have abundant fuel, it will not last forever, and, all other things being equal, should be conserved in favour of hydro energy which presumably goes on forever. An interesting sidelight on this problem of energy is shown by the following; in 1960 the total output of all thermal and hydro plants in Canada was approximately 89 billion K.W.H. If Alberta's coal were to be called upon to generate this amount of power year after year, it would last for approximately 1,100 years.

A popular fallacy, however, is that hydro power is always cheaper than thermal. In Alberta this is not so. By far the cheapest power in Alberta at the moment is that which we get from the Wabamun steam plant. The new 150,000 K.W. unit installed there during 1962, is using coal as fuel. It is anticipated that one of the other two units in that plant will be converted to coal firing during 1963. Using coal under the conditions present at Wabamun will produce power even more cheaply than by using natural gas there.

While Wabamun and future plants will use increasing amounts of coal and will thereby increase Alberta's coal output, they will have little bearing on the conventional coal mining industry. For some time in the future, coal for thermal power plants will be strip-mined. During its first full year of operation, the unit at Wabamun will use about 750,000 tons of coal. Alberta's present output of coal for all purposes is some 2,500,000 tons. As other units are changed over to coal and new plants are built, the output of coal will increase by leaps and bounds.

Such power plants require major coal fields to provide for their needs for 30 or 40 years. Only a relatively few areas have coal deposits which make them ideal for power generation requirements. An ideal field must have at least 100 million tons of coal which has an overburden of not more than a 100 feet, and it must be located close to a large supply of cooling water.

As such fields get used up it will probably be necessary to use three or four smaller fields and to pipe the coal from them into a central power plant located on some body of cooling water. So far, moving coal by pipe line has not worked too well. The Research Council of Alberta, however, has been carrying on some studies that appear to hold prospects for the development of a feasible means of piping coal. If these studies could be carried to a successful conclusion, possibly by means of a pilot plant, they could have a tremendous bearing on reviving the coal industry.

Because of the nature of Alberta's fuel resources, the ideal arrangement in the near future would be to generate some 90% of the K.W.H. needed in the Province in steam plants, leaving the remaining 10% to be generated by hydro plants. The peak load in the Province during 1962 was 843 M.W. Since the capacity to supply much of this load is only needed for such short intervals of time, the hydro plants, generally speaking, are well suited to perform this function. Hydro plants representing about 40% of the generating capacity of the Province would be required to carry the necessary portion of the peak load and, in doing so, would generate 10% or less of the K.W.H. The capacity of Alberta's power plants is some 1092 M.W. Of this, some 220 M.W., or 20%, of the capacity was used for only slightly over 2% of all the hours in the year, and, in doing so, only generated 2/10 of 1% of all the K.W.H. used in the Province.

Now, because 20% of our installed capacity is only called into use for 2% of the time in any one year and that then it only generates 2/10 of 1% of the year's power, we find it economical at present to use our Alberta rivers for producing this kind of peak power. As compared to the rivers in Manitoba, Ontario and Quebec and those in British Columbia, the flow of our rivers does not lend itself to producing power which we need 24 hours a day and 365 days in the year. The reason is that nearly all the water comes rushing down from the mountains during May and June and then for the rest of the year the rivers are almost dry. Our greatest demand for power does not occur during these months of early summer so our hydro plants and dams are built so as to store the summer water for use during the peak load periods of the winter. As our load grows to the point where huge storage projects will be economical, we may expect to see a move back to using some of our streams for base load.

There are several hydro sites which can be developed when more peaking power is needed and, indeed, some that might be used to carry base load for several years to come. Some of these are on the Bow River; other sites are on the Saskatchewan and Brazeau Rivers and the Athabasca River has a large potential capacity. The total hydro power potential of Northern Alberta exceeds 2,700,000 h.p., of which 1,600,000 h.p. is available on the Athabasca River below Athabasca, as shown in the following table and the accompanying map:

Power Sites on Athabasca River Below 19th Baseline

Site Name	Location	Full Supply Level	Maximum Head	Continuous Plant Output K.W.	Installed Turbine Capacity H.P.
19th Baseline	Twp. 72-18-4	1,675	100	28,800	104,000
Pelican Rapids	Twp. 79-17-4	1,575	155	59,400	222,000
Grand Rapids	Twp. 84-17-4	1,420	203	93,300	378,000
Mile 193	Twp. 87-15-4	1,217	137	81,000	305,000
Crooked Rapids	Twp. 87-12-4	1,080	168	97,000	365,000
Mile 236	Twp. 88-10-4	912	92	62,700	223,000
	Totals:			422,200	1,597,000
					(Say - 1,600,000)

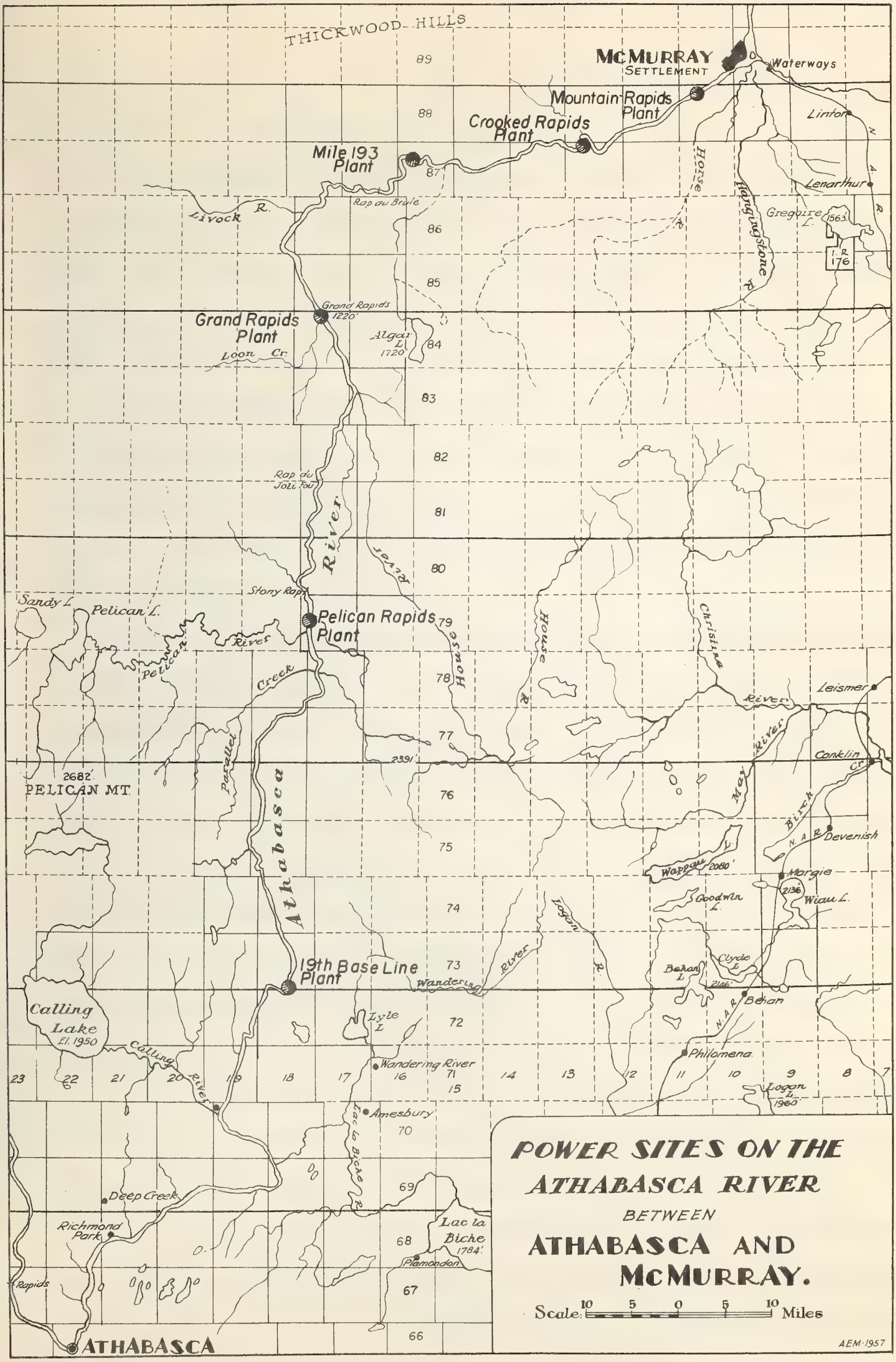
All of this power is within economical transmission distance of Edmonton and can be tied into the main transmission network, serving those areas of the Province which have heavy power requirements.

In addition to these sites on the Athabasca which have had considerable preliminary study, there is a site upstream from the Town of Athabasca which will likely be the first one to develop. This site has been studied in some detail and, from an engineering standpoint, appears to be an excellent one. From the standpoint of the economics of the power business which is concerned with getting the cheapest power at any given time in the future, whether it be hydro or thermal, it appears that the site above Athabasca Town should be developed about 1970. It will be a rather spectacular development and quite a costly one and, for this reason, will not come into the realm of economic feasibility until the load in the Province is much more than it is today. In the meantime, the load can be supplied by expansion of the Brazeau Dam and of the thermal plants.

At the moment, the Big Bend #1 site on the Brazeau is being developed. The main dam has been built up to its interim height and now creates a storage reservoir of some 350,000 acre-feet. During the past summer, much of the long canal leading to the power house has been completed and some work has been done on the power house site. A unit of 150,000 K.W. capacity is scheduled to come into operation there in the fall of 1964. Ultimately, this site will produce 600,000 K.W. in four units of 150,000 K.W. each. The complete development includes a main dam two miles long, with a maximum height of 250 feet, and two auxiliary dams. It will store 930,000 acre-feet of water and will have an area of 37 square miles.

The Brazeau Dam, of course, was built primarily to increase the flow in the North Saskatchewan River during the winter months. There was an urgent and growing need to provide relief to the pollution problem which existed in that River below Edmonton during the low water period from October to April.

In an endeavour to relieve the pollution problem, the Government was prepared to spend between $20 - $25 million for the necessary water control



POWER SITES ON THE ATHABASCA RIVER BETWEEN ATHABASCA AND McMURRAY.

structure on the Brazeau River. At that point, the Water Resources Branch, the Alberta Power Commission and Calgary Power Ltd. began joint studies on the possibility of a combined storage dam and power plant. Surveys and studies carried out during 1957 and 1958 indicated that a peak load power plant could be built at Brazeau. Calgary Power Ltd., however, found that it would be more economical for them to develop a peak load power plant at the Russell site on the Bow River. The Company indicated that it was certainly interested in the Brazeau but that, from its standpoint in considering the cost of supplying electricity, it would prefer to build the Russell plant first and then to follow that some time after 1970 with a plant on the Brazeau River. After these studies had been completed, a combined operation was worked out.

Under the agreement, the Brazeau dam was to be a combined water storage and peak load power dam at a cost of approximately $\$14\frac{1}{2}$ million. Since Calgary Power Ltd., of its own accord, would not have built this plant for many years, the Province undertook to pay approximately this amount of money for the construction of the dam, with the understanding that Calgary Power Ltd. would, from time to time, put generators into the plant and that, some time before 1980, would buy the dam back from the Province. This would be at the time when Calgary Power Ltd. would have built the dam on its own accord anyway. When that time comes, the Province will recover its full investment and all that it will be out will be the interest on the money it has had tied up in the dam. In the meantime, it has attained its objective of relieving the water pollution and all that it will be out of pocket is the interest on this money for a number of years. While the Province would have been willing to spend considerably more to relieve the water pollution problem, co-ordination of effort has effected this considerable saving. As it stands now, the Province will have approximately $\$14\frac{1}{2}$ million tied up for about 15 years. At the end of that time it will recover this money, which can be used for other public projects, such as highways, etc.

The Brazeau Dam is a typical case of co-ordinating two uses of water in the public interest. During the winter of 1961-62, the Dam passed a limited amount of water which increased the flow in the River at a critical time from a pollution standpoint. During the winter of 1962-63, additional water is available and is being released.

At the same time that hydro units are being installed, it will be necessary, of course, to keep adding units in the thermal plants to carry the base load. While detailed plans for the next five years are included under the section headed "Forecast to 1967", reference can be made here to some of the thermal units that are planned in the near future. The City of Edmonton will be installing another 75 M.W. gas-fired steam turbine during 1963 and plans call for another one of the same size to be installed in 1966. Beyond that, the City is considering the advisability of locating a coal-fired steam plant in some large coalfield, such as at Genesee. Canadian Utilities Ltd. is planning to install another 33 M.W. steam turbine in its Battle River plant in 1964. That same year, as was mentioned above, the first unit of the Brazeau plant will come into operation. Then, by about 1967, another coal-fired unit will likely be installed in the Wabamun plant, depending upon the load growth and other contingencies. This unit could be as large as 300 megawatts.

Unlike some other regions in Canada where the power authorities are forced to contemplate installing nuclear power, or to reach out hundreds of miles to bring in power from the hydro sites of the north, Alberta is abundantly supplied with sources of relatively cheap power. The problem is not one of searching for sites for power plants, either thermal or hydro, but is rather one of bringing into production whatever may be the most economical site at any given moment. The keynote of Alberta's planning, then, should be to make certain that, at any time, the next power plant to be built should be the one that will contribute the cheapest power to the excellent network of transmission lines which forms the backbone of the power system of the Province.

In the light of the rapidly rising cost of all commodities and services and of material and labour, the power producers and distributors have done a remarkable job in keeping the retail cost of power down. Electric power is one of the very few commodities or services in Alberta which, instead of rising in cost, has fallen. While in many parts of Canada rates for power have had to be increased, the private power companies have so far been able to stave off such an increase, and much credit is due to them for their economical planning.

As shown by the map at the back of the report, the network of high voltage transmission lines is expanding in a co-ordinate fashion year by year. The major power producers, Calgary Power Ltd., the Cities of Edmonton, Lethbridge and Medicine Hat, Canadian Utilities Limited and Northland Utilities Limited are bringing about interconnections which have the effect of utilizing their generating equipment to its utmost efficiency, and this process will continue. During the past year, a major 240 K.V. transmission link has been built from Wabamun to the vicinity of Calgary. Other lines will have to be built to tie the Brazeau power into the existing system. In addition to these, there is the projected line to connect the Peace River country with the rest of the Province. By means of such major transmission lines, the Province is covered with a grid system. The Power Commission is continuing its study of future interconnection possibilities.

The Power Commission is also represented on a national working committee, which is at present investigating the possibility of a trans-Canada grid.

This study will undoubtedly take two or three years. Whether or not such a trans-Canada grid is feasible at the present time has not yet been determined.

FORECAST TO 1967

At December 31, 1962, the capacity of the power plants in the Province was 1,092,000 K.W. At December 31, 1952 - ten years ago - this capacity was 288,000 K.W., so that the increase during the 10-year period has been 279% - a very large increase. The K.W.H. generated in 1962 were nearly three and one-half times the amount generated ten years ago and showed an increase of 9.4% over the corresponding figure for 1961. Due to mild weather, the increase in peak load over 1961, however, was only about 3%.

While a rate of increase of 9.4% in K.W.H. generated is high, we anticipate that the Province's electrical load will continue to grow at about this rate for the next few years. The population of the Province is increasing, new industries are coming in and the prospects of more gas export are all factors that will keep Alberta's rate of electrical growth very high.

Table No. 21 shows the growth which we believe will take place in the electrical load of the Province from now until 1967. It shows the actual capacity in K.W. of the power plants in the Province as at December 31, 1961, the increase in capacity during 1962 and the estimated peak load that occurred in 1962. It then goes on to deal with these year by year until 1967, showing our forecast of peak load and what the Companies and Municipalities are planning to do to meet that load.

It appears that, if the present plans for additional units are carried out, we should have ample reserve capacity until 1967. It is hard to predict what the peak load will be five years from now. It will be noted from Table No. 21 that, while base load thermal units are planned, much of the emphasis over the next five years is going to be on peak load units. The first unit at Brazeau is expected to come into operation during 1964. It is anticipated that the provision of these peaking units will permit the steam units to run at a higher load factor.

TABLE NO. 21

Forecast of Generating Capacity in K.W.
(Not taking account of isolated small plants)

	Capacity added during year	Capacity at end of year	Estimated Peak Load
Capacity at Dec. 31, 1961		946,617	813,000
Capacity added during 1962			
Calgary Power Ltd. - Wabamun	150,000		
Less minor adjustments	- 4,207		
Total Dec. 31, 1962	145,793	1,092,410	
		say, 1,092,000	843,000
Capacity to be added 1963			
City of Edmonton	75,000		
Northland Utilities Ltd. - Worsley	1,500		
Total Dec. 31, 1963	76,500	1,168,500	980,000
Capacity to be added 1964			
Canadian Utilities Ltd. - Battle River	32,000		
Calgary Power Ltd. - Brazeau	150,000		
Total Dec. 31, 1964	182,000	1,350,500	1,070,000
Capacity to be added 1965			
Canadian Utilities Ltd. - Worsley	17,000		
Total Dec. 31, 1965	17,000	1,367,500	1,170,000
Capacity to be added 1966			
City of Edmonton	75,000		
Total Dec. 31, 1966	75,000	1,442,500	1,270,000
Capacity to be added 1967			
Calgary Power Ltd. - Thermal	300,000		
Total Dec. 31, 1967	300,000	1,742,500	1,380,000

FARM ELECTRIFICATION

With 58,593 farms hooked up as at December 31, 1962, the construction phase of the Farm Electrification programme is nearing its end. During the year, service was extended to 2,825 farms. Some farmers have not yet taken advantage of the fact that the power line runs past their quarter or is within a short distance of their home; nevertheless the network of lines stands ready to serve them.

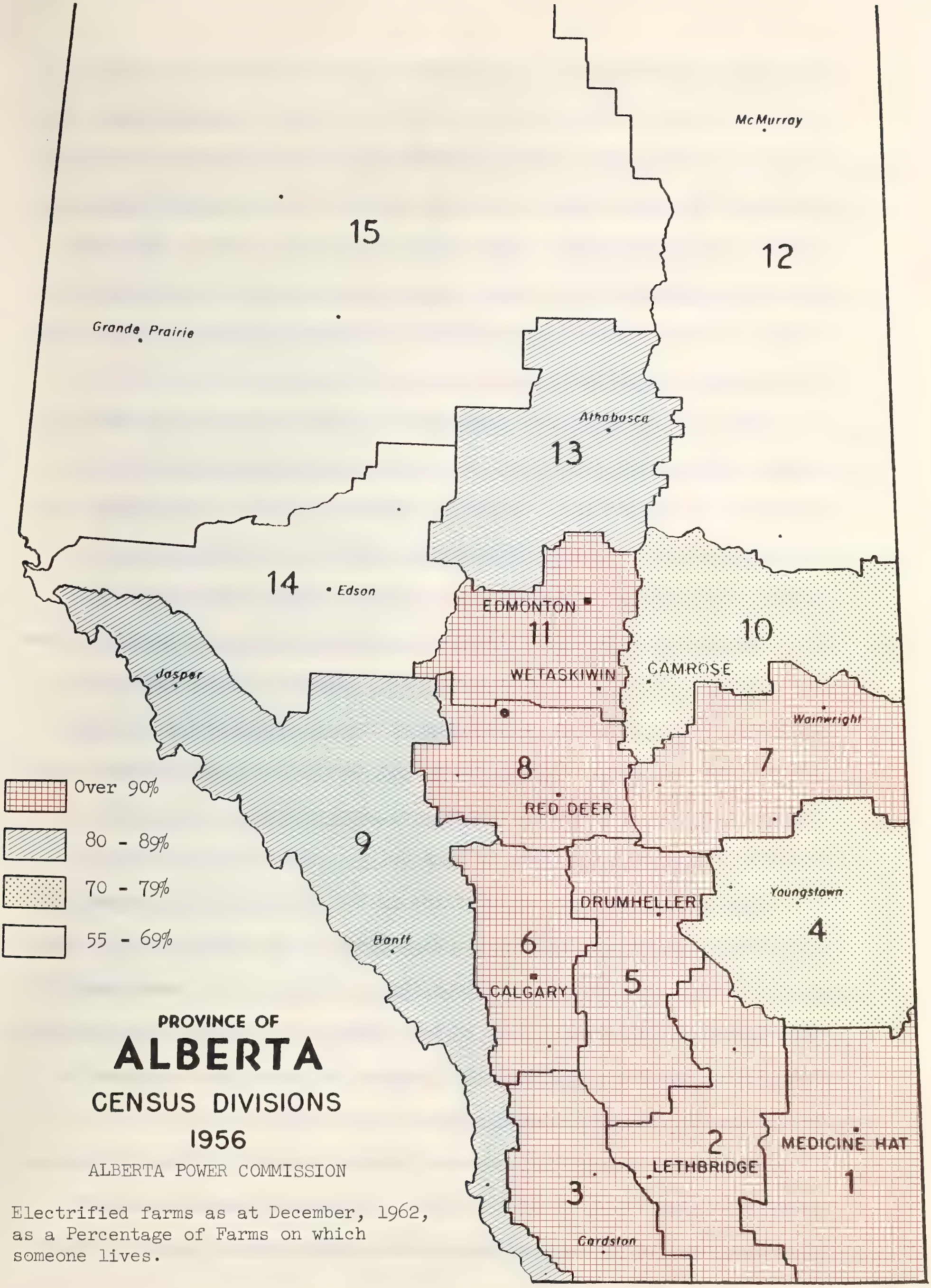
According to the 1961 census, 73,212 farms were being operated in Alberta. Of these, perhaps 10% are farms which are operated by someone who does not live on them. So far, the Dominion Bureau of Statistics has not released the exact figure for the number of such farms, but at the time of the 1956 census, it was over 11%. It is likely that this percentage has decreased, and for the purpose of our discussion, we are taking it at 10%. On this basis, then, there are probably 66,000 farms on which someone lives. Included in these, according to the census, are 576 farms on Indian Reserves. While there are 1,126 Indian homes receiving electric service, undoubtedly many of these are not classed as farmers under the census definition.

Based on the above assumption then, if on the one hand we deduct the number of Indian farms shown by the census, which is 576, from the figure of 66,000, we arrive at 65,424. Then, on the other hand, if we deduct the 1,126 Indian farms served from the figure of 58,593, we arrive at 57,467 non-Indian farms served, so that 88% of the non-Indian farms on which someone lives have been connected up.

The recent census reports show the number of commercial farmers in Alberta as 58,698. A commercial farm is defined as one "reporting $1,200 or more sales of agricultural products for a twelve-month period." While it is risky to make broad generalizations, the fact that there are 58,593 electrified farms as compared to 58,698 farms having sales of produce of over $1,200 per year, is interesting. A considerable number of commercial farms which are included in the number of farms electrified, fall into the group of farms on which no-one lives. Both the total number of farms on which someone actually lives and the total of the farms electrified include many farms which qualify as such by the census definition but are, in truth, little more than rural residences.

The Dominion Bureau of Statistics' definition of a farm has changed since the 1956 census and this change makes it hard to make comparisons with previous years. At that time, a farm was defined as a holding on which farming operations were carried out and which was three acres or more in size, or was from one to three acres in size with agricultural production valued at $250 or more. Now, by the new definition, a farm is a "holding of one acre or more with the sales of agricultural products during the past twelve months valued at $50 or more". While there used to be a fairly clear-cut idea in everyone's mind as to what constituted a farm, the old distinction between a farmer and a non-farmer is becoming less well defined. It is increasingly difficult to draw a line between the two. As one instance of the change in times, many families who work in a town or city actually live either on a fully fledged farm or on an acreage in the country. In some cases, such an establishment is obviously just a residence; in other cases, the owner keeps a few chickens or a cow or a few valuable horses and it is hard to draw the line between one and the other. The other side of the picture is that, with the use of electricity, many farmers on a piece of land of an acre or so are raising poultry, for instance, valued at many hundreds of dollars.

It will be seen by the map which shows the saturation of farm electrification by census divisions as at December 31, 1962, that throughout



PROVINCE OF

ALBERTA

CENSUS DIVISIONS

1956

ALBERTA POWER COMMISSION

Electrified farms as at December, 1962, as a Percentage of Farms on which someone lives.

the richest farming areas, the saturation is very high and that it is somewhat less in divisions 4, 9, 10 and 13. Since census divisions 12, 14 and 15 include the fringe areas where agricultural income is the least, these are the areas in which we might expect to find a smaller percentage of the farms electrified. According to the census reports, the percentage of commercial farms is much lower in these census divisions than in regions further south. Similarly, the saturation of farm electrification is also lower in these divisions.

While not too many more farms will be added in those areas which have pretty well reached saturation, we do expect a large increase in census divisions 12, 14 and 15. Generally speaking, however, the existing network of lines covers these divisions so completely, that the lines are within a mile or two of a very high percentage of the farms in them. Here and there, around the fringes of settlement, there may be two or three small groups of 15 or 20 farms each which, because they may be isolated by a gap of five miles or so from the nearest farm adjacent to existing lines, have not found it practical to get service. In other words, except for the farms in the Fort Vermilion area, the network of lines makes it possible for nearly all farms to hook up.

There are approximately 250 farms in the vicinity of Fort Vermilion and in the area west from there to High Level. The farms from High Level to Fort Vermilion area and down into the LaCrete area have power available from Northland Utilities' plant at Fort Vermilion. A Rural Electrification Association has been formed in that region, but so far there appears to be little interest in building lines.

Now, with the construction phase of the farm electrification programme practically completed, it is interesting to look back a little over 15 years to the time of the production of the Andrew Stewart report on Rural

Electrification in Alberta. The main predictions in this report were the following:

"1. If conditions in Alberta were substantially similar to those elsewhere, electrification of 30% of the farms in the province, over a period of ten years, would be an accomplishment fully commensurate with achievements elsewhere. Such a programme would involve the electrification of 30,000 farms at an average rate of 3,000 per year.

"2. An area including all existing transmission lines is referred to as the potential service area. This area includes approximately two-thirds of the rural population and about the same proportion of all farms in the province.

"3. Consumption per farm is difficult to predict. If average consumption for farms connected for one year was 300 kwhr., the average consumption over the entire system would be 750 kwhr. per year, at the end of ten years.

"4. The evidence clearly suggests that farm people want electricity primarily for domestic uses. Having in mind the existing lack of conveniences in farm homes, that is a laudable objective. However, domestic uses do not immediately increase farm incomes, nor is it possible to support rural electrification where power is used only for lighting and for a few household appliances."

These were the conclusions reached by members of Andrew Stewart's committee after studying conditions, not only as they existed in Alberta, but in other Canadian provinces and in some parts of the United States. These, in fact, were the sensible conclusions of a group of capable men. Post-war reconstruction committees, leaders in industry and farmers, too, all expected a recession after the war, and all had their eyes still turned to the days of 1935.

Today, in the light of our hindsight, we find 58,593 farms electrified with the average farmer using 4,769 K.W.H. per year. We find that, with the exception of the Fort Vermilion area, R.E.A. lines are now built into the most remote corners of the Province in which a handful of farmers live. We are now serving over 88% of all the farms in the province and those which are not taking service are practically all adjacent to lines. When we look at the picture today, we wonder what has happened to bring about this amazing transition during which farmers have built rural lines worth $56 million and, on top of that, have spent substantially an equal amount on electrical machinery and appliances.

The offhand answer is that everyone in either urban or rural communities has experienced an unprecedented increase in his standard of living. This increased standard of living, however, has to be based on income and on new wealth produced. While, perhaps, farmers on the average have had a lesser share of this increase, the Net Value of Commodity Production - i.e., the increased wealth produced by farmers, has made a striking growth. Agriculture's share of the net value of production in the province has increased from an average of $76 million per year in the three-year period from 1934-36 to an average of over $351 million per year in the three years from 1959-61. There are, of course, marked ups and downs in this production of new wealth from year to year, with the best years concentrated in the early 1950s. Despite these variations, net value of farm production now averages over 4½ times as much as it did 25 years ago. During this same 25-year period, consumer price indexes have only just slightly more than doubled. It is also significant that the number of occupied farms in the province has decreased to between 65 - 70% of the number occupied in the 1930s, and thus the increased production may be divided by fewer farmers to provide a markedly higher average income for those farmers who have stayed on the land. How much the availability and use of electricity has contributed to this increased productivity of farms is hard to say, but its effect must be considerable.

The following table shows the number of farms connected as of December 31, 1962. It also shows the number of non-farm customers served off farm lines.

While there are 58,593 farmers connected, farm electrification also served 8,948 non-farm customers who would not have obtained service otherwise. The total number benefitting by the construction of these farm electrification lines is, therefore, 67,541.

At the end of December, 1962, there were 42,479 miles of farm lines and, during the year, 1,352 miles had been constructed.

TABLE NO. 22

Combined figures for Alberta

Farm Electrification as at December 31, 1962.

	No. Farms Connected	Non-Farms	Hamlet Customers	Total Non-Farm Customers	Total Served off Farm Lines
Experimental Areas	3,320	718	461	1,179	4,499
Completed R.E.A.s	53,081	3,510	4,259	7,769	60,850
Individual Rurals	1,938	--	--	--	1,938
Farms supplied by Cities	254	--	--	--	254
Total Actually Served	58,593	4,228	4,720	8,948	67,541

Financing

At the end of December, there was a total of 371 active Rural Electrification Associations. These Associations have borrowed under the Guarantee Act, the Revolving Fund Act and the Long Term Financing Act, and the total of all of these borrowings for new construction has been approximately $43,770,000.00. At December 31, 1962, over $23,800,000.00 of this had been paid back. The investment in all rural lines in the Province is approximately $56,000,000.00.

By the end of 1962, the Power Commission had given approval to 3,263 applications for loans under Part I of the Revolving Fund Act or under the Long Term Financing Act. While all of this money had not been borrowed by the end of December, the approvals covered 36,109 farms at an estimated cost of $41,529,000.00.

During 1962, the Power Commission gave approval to 369 applications for loans under Part I of the Revolving Fund Act or under the Long Term Financing Act for an amount of $2,968,055.00 to give service to 2,432 farms. Of this amount, $2,856,555.00 was loaned where no Part II loan was necessary. Of the 2,432 farmers signing contracts under the Revolving Fund Act or under the Long Term Financing Act, 71 of them were in areas that needed the assistance of Part II loans. In such areas, Part I loans totalling $111,500.00 were approved in conjunction with Part II loans totalling $32,776.00. The framework of lines in these new Part II areas will make it possible for an additional 49 farmers to connect to them whenever they are ready.

Since the inception of Part II loans, an amount of $1,853,619.00 has been approved. As at December 31, 1962, $1,287,655.00 of this has been paid back. Out of a total of 291 Part II loans which have been issued to date, 125 have been repaid in full and a great many more are nearly all paid off.

The existence of Part II loans made it possible to build a framework of lines in areas which otherwise could not have obtained service. There were 9,347 farmers in these areas and initially 3,833 of them took advantage of this financial assistance to get their lines built. When the remainder of the farmers in these areas take service, it will be possible to pay off the outstanding balance of the Part II loans. These loans have made it possible to extend lines to many areas of the Province which otherwise could not have had service. There are only one or two areas left now which do not have a network of lines, and for this reason, we do not expect very heavy demands for Part II loans from here on.

Checking Costs

During the year, the Commission has checked all the cost statements which the Companies have rendered to R.E.A.s, showing the costs of building their lines. In addition to this, some field checks have been made on various farm areas. With very minor exceptions, these costs have always been found to be correct. These checks further show that the areas have been constructed at cost. The Power Companies are building these areas at cost and, from an engineering standpoint, they are building them efficiently.

The Power Commission feels that it is its duty, not only to investigate problems brought to it, but also to investigate any phases of farm electrification which it believes require study. While the building of farm lines appears very simple and the operation of them is taken for granted, nevertheless, there are many intricate problems to be considered if we are to keep all expenses down to the very minimum. Many questions such as accumulation, investment and use of deposit reserves, monthly versus quarterly billing, card meter reading and operating charge per foot of line, all merit careful and continuous study. As each of these problems is solved, a new one arises to take its place. In its engineering and accounting aspects, farm electrification is highly technical and the individual farmer does not have the time nor the opportunity to investigate these matters. The Power Commission feels that one of its main responsibilities is to see that consideration is given to every factor that could possibly reduce the cost of electricity to the farmers.

The question of the correctness of operating charges made to farmers is constantly under study. We believe that the Power Companies are doing a remarkable job of keeping these costs down and of accounting to the farmers for them. In all the years to date, the actual costs have been less than the monthly charges made to the farmer in his power bill, so that, at the end of each year, the Power Companies have been able to make a refund to the deposit reserves of the Associations. The operating charges made in Alberta appear to be reasonable and compare very favourably with those made by R.E.A.s who are operating in similar territory in the United States. One of the advantages gained by our farmers which enables these charges to be kept low is the rather unique method of operating R.E.A.s in Alberta. While in the United States the R.E.A.s are generally larger than they are in Alberta, each R.E.A. there maintains its own supervisory, office and operating staff, with the result that its overhead is apt to be high. In Alberta, where the expenses of operating R.E.A. lines are pooled over all the farmers being served by any one power company, and where, for instance, Canadian Utilities Limited does the operating for nearly 14,000 farms, and Farm Electric Services Ltd. does this work for some 37,000 farms, the overhead from a number of small offices is not added to operating expenses. In other words, these companies operate the farm lines and do the billing and accounting more efficiently than would be the case if this were being done separately by a number of small R.E.A.s. Unfortunately, the utmost efficiency in operating these lines is not enough to keep pace with the inflationary rise in material and labour costs. As the lines get older, more petty maintenance is becoming necessary and this adds to operating expenses. Increases in cost are gradually narrowing the spread between the actual costs and the nominal operating charge.

One of the problems which the Power Commission is investigating is what effect the changing status of farms - the decrease in the number of farms and the increase in the size of farms - will have on farm electrification lines. The number of farms in the Province ten years from now and twenty years from now, and the intensity with which farm operations will be carried out in certain areas, are items which have a bearing on the design of rural electrification lines as well as on the adequacy of the deposit reserves which are being accumulated.

During the past twenty years, the number of farms being operated in Alberta has been decreasing rather rapidly, although in recent years the rate of decrease is not so marked. In 1951, there were 84,315 such farms in Alberta; by 1961 the number had been reduced to 73,212. It appears likely that by 1981 this number will be further reduced to, possibly, 57,000. On the other hand, the size of farms has been increasing. Whereas the total acreage per farm in 1951 was 525, by 1961 it had increased to 645 acres. Projecting this trend into the future would indicate that the average size of a farm might be of the order of 900 acres by 1981. These changes will be most obvious in grain and mixed farms.

Changes will undoubtedly take place in the types of farms. By 1981, the population of Canada will probably be one and a half times what it is now and Alberta's population is expected to increase from 1,370,000 today to some 2,000,000 in 1981. While this change is taking place in Alberta's population, the number of farmers will continue to diminish, although the urban and rural non-farm population is likely to approach a figure nearly double what it is today. This being so, the demand for Alberta-grown agricultural products will likewise double, and the effect of this will be felt particularly by those farmers who rely for the most part upon the provincial market for the disposal of their products. The fluid milk industry, for instance, and the poultry industry and, to a lesser extent, the vegetable industry, will all feel the impact of urbanization. Since farmers producing milk and poultry tend to be concentrated in the areas, say, within fifty miles of one of our cities, it is likely that the increased production of milk and poultry will come about by the expansion of existing farms within these areas. It appears likely, for instance, that, if more milk is to be produced, the increased production will come largely from dairy farms now in existence. In this way, many of these existing farms will become larger with undoubted increases in efficiency. These remarks also apply to the development of what might be called egg sheds around the major cities. Expansion of the egg industry can occur very quickly and it appears likely that an increase in the demand for eggs will be made mainly through expansion of existing poultry farms. This, too, appears to be true of the broiler industry.

It appears probable that from a relatively minor start in the production of vegetables in the irrigation districts, we may expect a considerable expansion. As our population increases and as the farmers really turn their attention to producing and packaging vegetables on a large scale, we may expect a considerable increase in the output from the irrigation districts. Undoubtedly, many farmers not now engaged in vegetable production will switch over to this field. Offsetting this, however, there will be a tendency towards fewer but more specialized vegetable farms.

One possibility that should not be overlooked is the use of electricity for irrigation sprinkler systems.

All of these farms will be producing mainly for consumption within the Province. The red meat industries, on the other hand, are more dependent on national and international markets and the demand for these commodities will be closely related to Canada's population and to the growth in export markets.

Today, some 90% of the electrified farms in the Province use a 3 K.V.A. transformer. As agricultural production becomes more intensive as indicated above, the percentage of larger transformers will increase. While this percentage increase is likely to be nearly all confined to the irrigated areas and to the areas within a radius of, possibly, 50 miles of our cities, it poses some problems in the design and operation of farm electrification lines. As the load per farm increases, the size of substation transformers will also have to increase and it will become necessary in some R.E.A.s to increase the wire size on the feeders leading out from the substation. It may be necessary in some cases to change some miles of the feeder lines over to 3-phase. Indeed, there are some farmers at the moment whose operations are large enough that they might welcome a 3-phase installation in their yard.

The Power Commission has been trying to guess the future trends in agriculture so as to foresee as far as possible what complications may arise in farm electrification, and what the farm electrification lines may be called upon to do. Fortunately, the whole system of farm electrification as originally laid out, lends itself to flexibility and this applies to the design of the lines as well as to the rates for various transformer sizes, etc.

One question which we think will become more prominent in the future is that of where to draw a line between a farmer and a commercial enterprise. One possible place to draw the line is to consider any operation a farm where it is operated by an individual, a partnership or by one of the several forms of corporations, so long as it confines its operations to the produce grown on its own property. For instance, such a farm growing potatoes and storing, grading, washing, packaging consumer packs and delivering them to wholesalers, might be considered as a farm, even if its electrical load required a 100 K.V.A. transformer. If, however, in order to carry out the packaging, etc., on a large enough scale, the operator of the farm also performed washing and packaging on a custom basis for his neighbours, then he would be considered as having a "commercial" type of operation. Since changes are taking place so rapidly in farming operations, it might well be time now to try and work out some sort of a distinction between a farm and a commercial operation handling farm produce exclusively. In working out such a definition, the Power Commission is going to look to the Union of R.E.A.s and to the Power Companies for assistance.

Deposit Reserves

The question of the adequacy of the deposit reserves being set aside has been under study for some years. Some of the older lines of the first R.E.A.s are now at the midpoint of their useful life. In general, it appears that most deposit reserves will be adequate, but there will undoubtedly be some R.E.A.s in which, because of their high mileage of line per farm, it may be desirable to increase the annual accrual. While the Power Commission has developed a method by which it can assess the adequacy of existing deposit reserves, many assumptions have had to be made. Some of these will prove to have been too optimistic or pessimistic but it is expected that the errors will compensate each other. If experience should prove any of these assumptions to be badly out of line, our annual review will catch this trend before it has gone too far.

After discussing this problem with the Union of R.E.A.s, it was decided that the Power Commission should set up a system of records of the reserves of all R.E.A.s. There are some 370 of these in the Province and a schedule has been set up so as to make a detailed study of the reserves of some 100 R.E.A.s each year. In this way, starting with the older ones, the position of each R.E.A.'s reserve will be examined at least once every four years and more frequently, if necessary. In any case, where the deposit reserve appeared to be building too rapidly, it would be possible for the R.E.A. to reduce the amount of reserve by making a cash rebate. At one time it was thought that the way to approach this would be by discontinuing the monthly deposit reserve payments for a year, or perhaps for two or three years. After discussing this with the Union of R.E.A.s and with the Power Companies, it has seemed advisable not to discontinue the monthly charge but to continue making this charge and then, at intervals of two or three years, to make a rebate. On the other hand, if the deposit reserve appears to be clearly inadequate, the Power Commission could recommend to the R.E.A. that the monthly payment be increased. In this way, the position of the deposit reserve would be reviewed and revised periodically and any necessary adjustments could be discussed with the R.E.A. and the Power Companies.

After rather intensive studies of deposit reserves for two or three years now, it appears that very few R.E.A.s find themselves with too much money in their deposit reserve. From time to time, the Power Commission has had the opportunity of discussing this problem with the Directors of various R.E.A.s, and we believe that, as a result, more and more R.E.A.s are beginning to see the necessity of this reserve.

The average K.W.H. used per farmer in Alberta today is 4,769 K.W.H.

per year. This is higher than the national average and much higher than anyone could have foreseen ten years ago. This high use of power, while it is an indication of the value of farm electrification to Alberta farmers, is making it necessary to increase the size of substation transformers and, in some cases, to increase wire size on some feeders. Provision was made in the deposit reserve to allow for this and in those areas experiencing the heaviest use, this work is being done and is charged to the reserve. While the original lines were designed for what at the time was considered a high use, it was obviously impractical and too costly to build the lines to a heavier standard then. Doing so would have meant that the original farmers would have had to carry a uselessly high investment for many years.

We look upon the money being paid into deposit reserve by any farmer in any one year as his share of the depreciation that takes place during that year that he is using the line. Since the beginning of farm electrification in the Province, over 25% of farms have changed hands and, if we look down the road another 25 years, most of the farms will have changed hands either by the original farmer selling out or by giving his farm to his son, etc. When he sells the farm, he sells it at a price that will also pay the cost of the power line. If we take a farmer who has had power for 15 years, say, he sells the power line for at least what it cost him originally and leaves in the deposit reserve the money that he has paid year by year. The new man buys the farm and the power line on this basis. He can see that the power line has depreciated considerably but is willing to pay the full price for it because he knows that in the deposit reserve there is enough money to take care of this depreciation. Theoretically, what he has paid for is a piece of depreciated power line, plus enough deposit reserve to make it as good as ever. In his turn, he continues to make monthly payments to the deposit reserve until, when the day comes that the line is worn out, there is enough money to rebuild it.

The end result to the farmer who sold the line is that, when he sold out, he got back his original investment and has merely paid deposit reserve for the number of years he has used the line.

Peak Load

The annual use of electricity per farmer in Alberta during 1962 has been 4,769 K.W.H. In the aggregate, the electricity consumed by farmers accounted for slightly less than 7% of the total power generated in the Province. While the farmers use only 7% of the K.W.H., however, they are responsible for 14% of the peak load. The percentage which the farmers will use of the K.W.H. generated in the Province is never likely to exceed 7% of the total output.

But the total K.W.H. that the farmers use is not so significant as the peak load they impose on the generating and transmission facilities. The estimated combined peak load used for farm electrification is 120,000 K.W. This 120,000 K.W. is a large proportion of total plant capacity and consequently means that a large proportion of the companies' investment in plants and transmission lines is reserved solely for farmers. The companies' investment in this equipment, which is reserved solely for the farmers' use, will be well over $600.00 for each farm served.

The average farmer's electric load factor is very low and is something of the order of 27% as compared to a Province-wide load factor of about 50%. This question of load factor is an important one and, while it confronts many industries, it bears most heavily on the gas and electric utilities. The highest electric peak load of the year usually happens just before Christmas and may have a total duration of only an hour or so on two or three different days at that time of the year. The power companies have to install enough generating capacity to meet that peak even though for the remainder of the year all of this capacity is not used.

Once the generating capacity is installed, and this is particularly so of hydro plants, the cost of operating it 24 hours a day is not such a great deal more than the cost of operating it one hour a day. In other words, the cost of generating 24 K.W.H. per day with one K.W. of equipment, is not much more than generating one K.W.H. per day with one K.W. of equipment. This being the case, any customer such as a paper mill in the East, for instance, which can use a fairly constant amount of power for 24 hours a day for 365 days a year, can obtain this power very cheaply. Such a customer has a load factor of nearly 100%. An example of a customer at the other end of the scale would be a community hall used for only a few nights during the winter and therefore having a load factor of possibly 1%. The average load factor placed upon the plants in Alberta is about 50% - that is, on the average, the generators produce only one-half of what they could if the load was such that they could run steadily for 24 hours a day.

The 58,593 farms in the Province fall far below this average of 50% and have an actual load factor of about 27%. Some 120,000 K.W. of generating equipment has to be reserved solely for their use over the peak load period, but for the year as a whole, it is only used 27% as much as it could be.

In order to improve their load factor, farmers would not only have to use more electricity than they do now, but would have to arrange their farming operations so as to use the extra power at an off-peak period. This matter has been discussed with the Union of R.E.A.s. As a result, the Power Commission, Farm Electric Services Ltd., and Canadian Utilities Limited, made surveys of some farm loads to see what might be done to encourage more off-peak use of power. The studies, which extended over a couple of years, were somewhat frustrating. It appeared that some farmers, by planning their work, could operate some of their energy-consuming devices off peak, and thus improve their load factor. In most cases, however, it appeared not too practical to expect such careful planning in the use of power. While it is probably not possible to make major changes in farming practice in the use of electricity, nevertheless, this does present an avenue which would lead to reduced power bills so long as all farmers were to work toward that end. It is a subject, towards which farmers might direct some thought, in the hope of improving their load factor.

As a result of the studies and of the discussions between the Power Companies, the Union of R.E.A.s and the Power Commission, the Companies agreed to work out an incentive-type rate which, in a general way, it is hoped will accomplish the same end as that sought by the installation of relays.

The proposed new monthly energy rates for all three Companies within the southern interconnected system will be as follows, depending on the transformer size:

	Transformer size in K.V.A.			
	3 and 5	7½	10	15
K.W.H. @ 2¢	400	800	1,200	1,700
Excess @ 1.5¢				

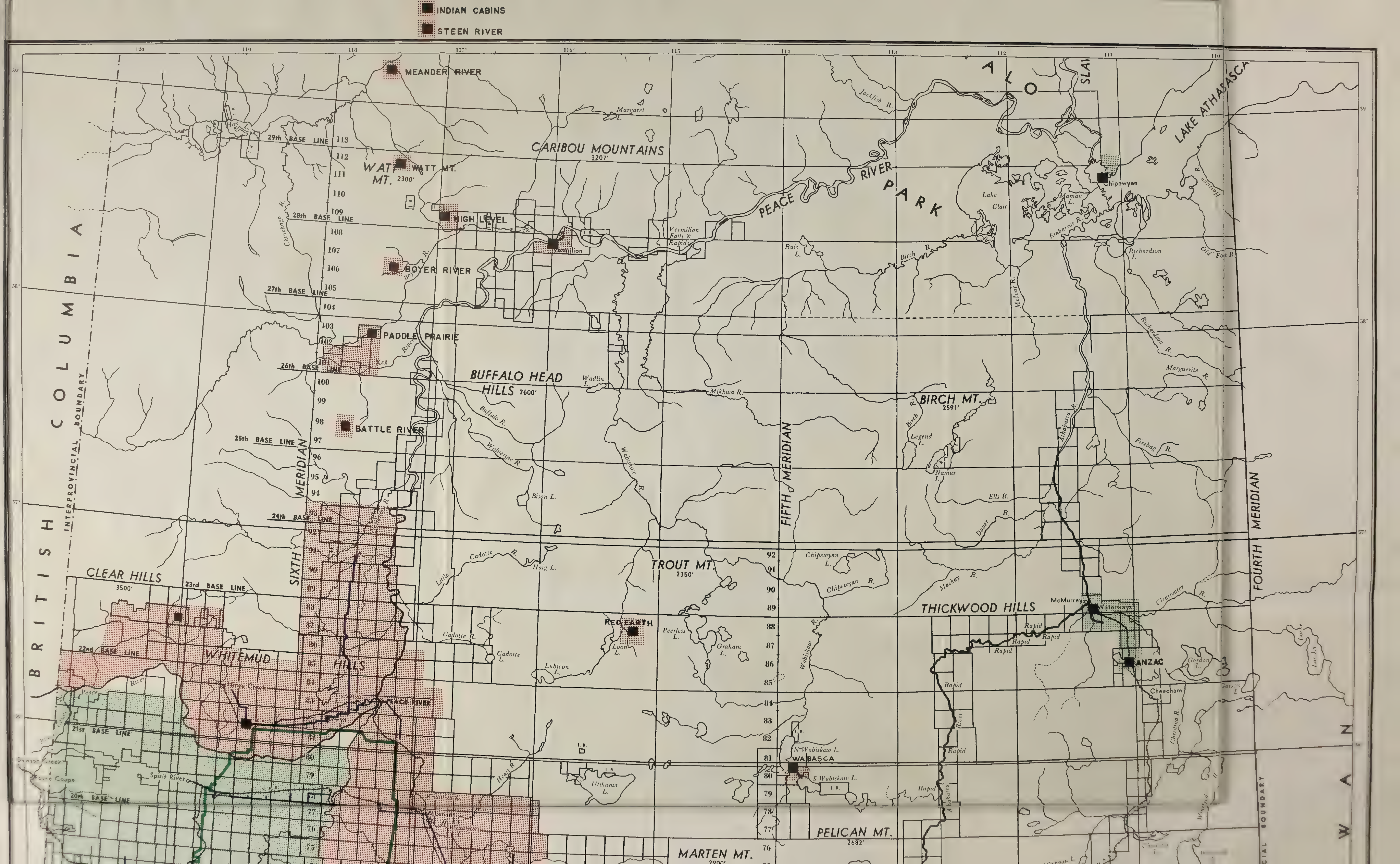
By the southern interconnected system we mean all that area generally south of the Athabasca River, served by Northland Utilities, Ltd., Canadian Utilities Ltd. and Calgary Power Ltd., except the Smith R.E.A., which is served by an isolated plant.

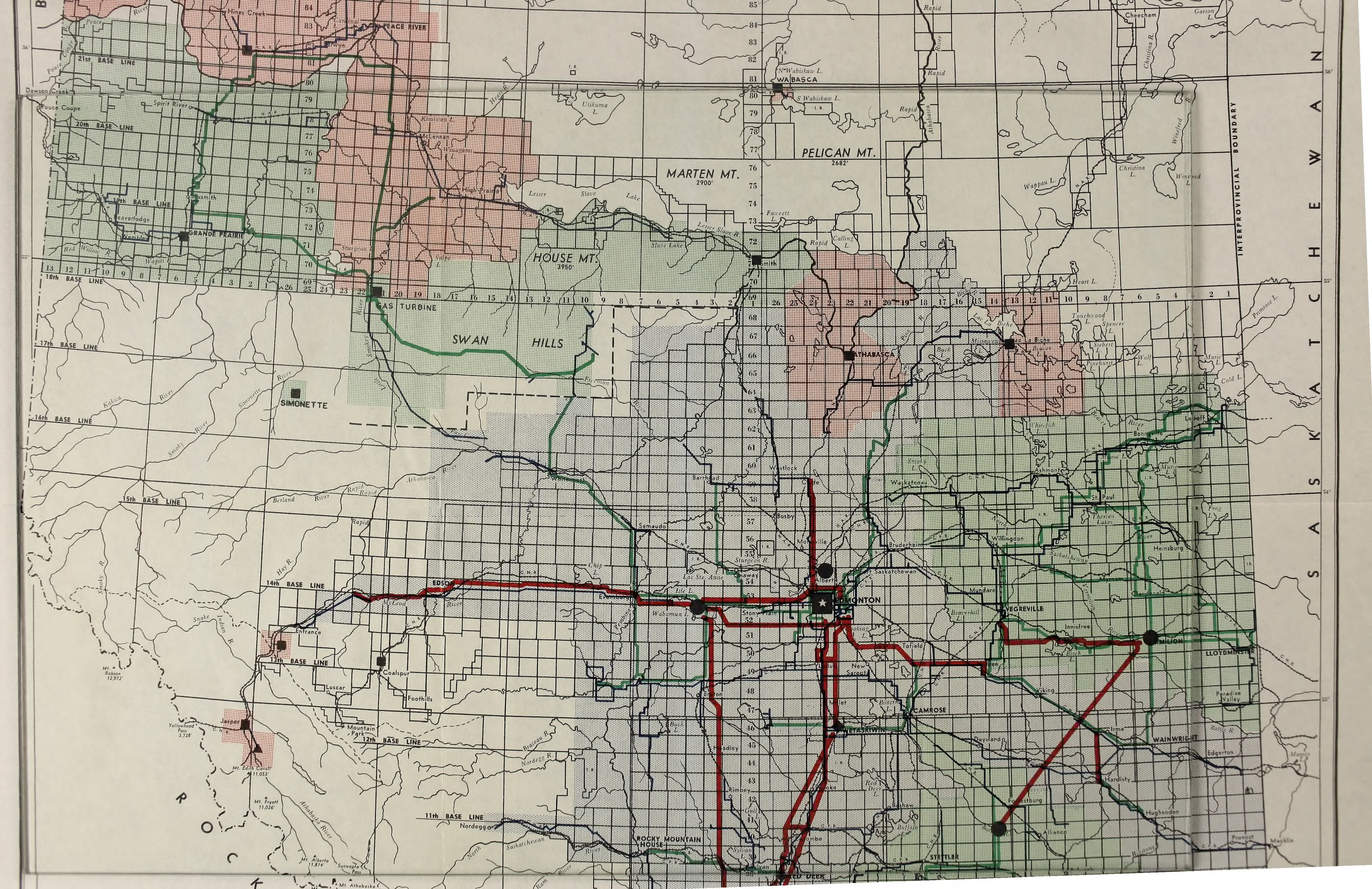
In the main part of the Peace River country, served by the interconnected system, including also the Smith R.E.A., the rates will be as follows:

	Transformer size in K.V.A.			
	3 and 5	7½	10	15
K.W.H. @ 2.2¢	400	800	1,200	1,700
Excess @ 1.7¢				

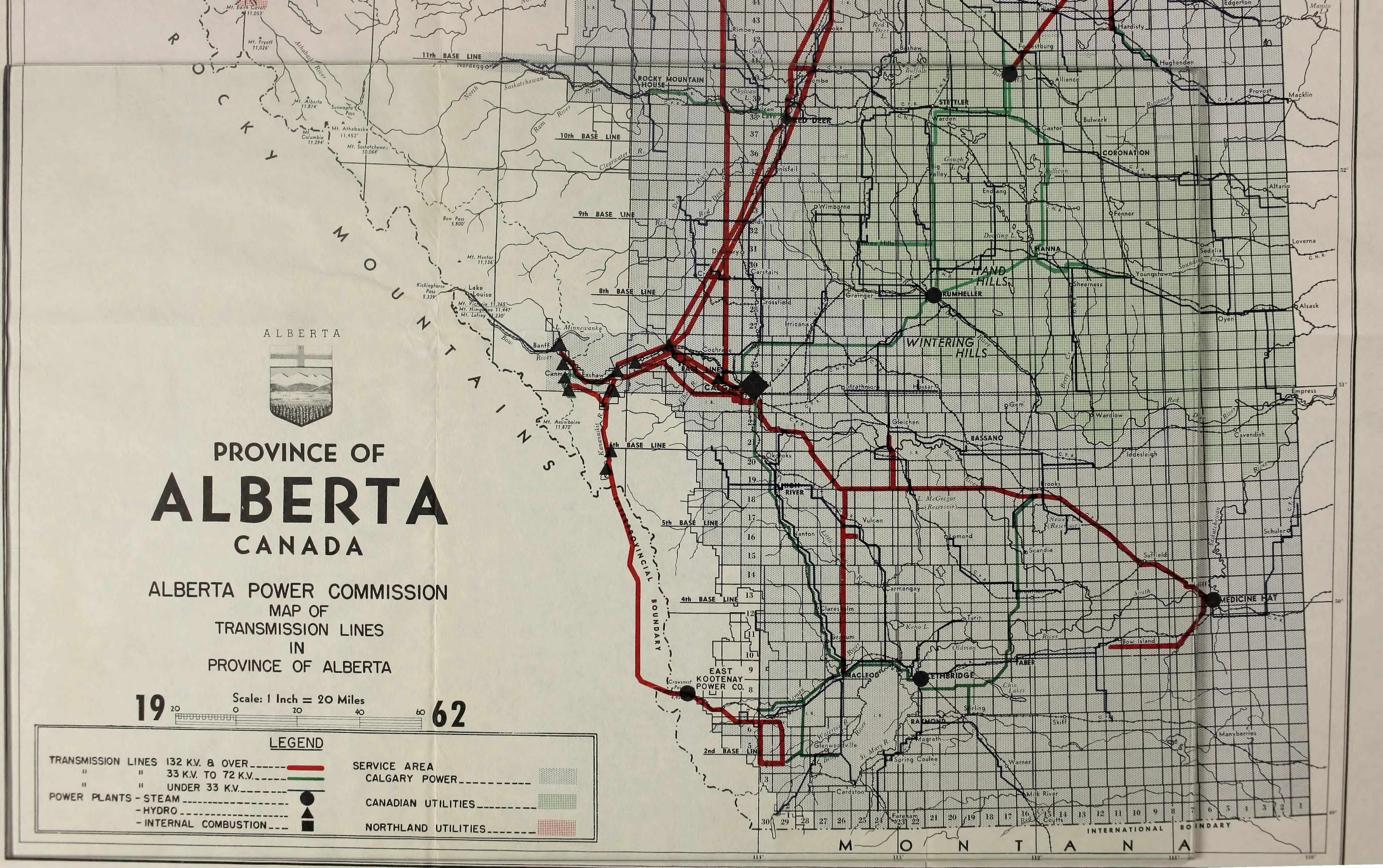
This interconnected system does not include the Baytree-Bonanza R.E.A., or the West Pouce Coupe R.E.A., as well as three farms in the Gundy area, all of which are served by Canadian Utilities Ltd., and the Cherry Point R.E.A., served by Northland Utilities. In the case of these R.E.A.s, the power supplied to these farmers who are isolated from the rest of the system is purchased from the B.C. Power Commission and is charged to these farmers each year at exactly what the Companies pay the B.C. Power Commission. Moreover, the interconnected system does not include the Keg River and Fort Vermilion R.E.A.s which are served by isolated plants. In the case of these two, however, the energy rate has been 6¢ and will be reduced to 4¢.

The Power Commission's annual calculation of the cost of energy sold to farmers has always indicated that, before this adjustment, the rates in effect were equal to, or less than, what the power cost the Companies. The proposed reductions, therefore, are going to be made at a considerable initial loss to the Power Companies. This move on their part is indicative of their faith in our farming industry. They hope that the incentive offered by the reduced rates will encourage greater utilization of existing facilities and hence bring about an improvement in load factor and a resulting reduction in energy costs.


INDIAN CABINS
STEEN RIVER
MEANDER RIVER
WATT MT. 2300'
WATT MT.
CARIBOU MOUNTAINS 3207'
HIGH LEVEL
Vermilion
BOYER RIVER
PADDLE PRAIRIE
BUFFALO HEAD HILLS 2600'
BATTLE RIVER
PEACE RIVER
WOOD BUFFALO PARK
LAKE ATHABASCA
Chipewyan
Lake Claire
BIRCH MT. 2591'
TROUT MT. 2350'
RED EARTH
THICKWOOD HILLS
McMurray
Waterways
ANZAC
Cheecham
WABASCA
PELICAN MT. 2682'
MARTEN MT.
CLEAR HILLS 3500'
WHITEMUD HILLS
PEACE RIVER
SIXTH MERIDIAN
FIFTH MERIDIAN
FOURTH MERIDIAN
BRITISH COLUMBIA
INTERPROVINCIAL BOUNDARY
29th BASE LINE
28th BASE LINE
27th BASE LINE
26th BASE LINE
25th BASE LINE
24th BASE LINE
23rd BASE LINE
22nd BASE LINE
21st BASE LINE
20th BASE LINE
Hay L.
Margaret L.
Vermilion Falls & Rapids
Jackfish R.
Wadlin L.
Mikkwa R.
Buffalo R.
Wolverine R.
Bison L.
Wabiskaw R.
Cadotte R.
Haig L.
Little
Chipewyan L.
Chipewyan R.
Mackay R.
Clearwater R.
Peerless L.
Graham L.
Loon L.
Cadotte L.
Lubicon L.
Utikuma L.
N. Wabiskaw L.
S. Wabiskaw L.
Heart R.
Spirit River
Pouce Coupe
Richardson L.
Richardson R.
Marguerite R.
Firebag R.
Ells R.
Dover R.
Legend L.
Namur L.
Birch R.
McIvor R.
Embarras R.
Maman L.
Old Fort R.
Athabasca R.
Christina R.
Gordon L.
Rapid
Chinchaga R.
Keg
Boyer R.
I.R.
Ruis L.
Gregoire L.
120
119
118
117
116
115
114
113
112
111
110
59°
58°
57°
56°



PEACE RIVER
21st BASE LINE
20th BASE LINE
19th BASE LINE
18th BASE LINE
17th BASE LINE
16th BASE LINE
15th BASE LINE
14th BASE LINE
13th BASE LINE
12th BASE LINE
11th BASE LINE
Dawson Creek
Pouce Coupe
Spirit River
GRANDE PRAIRIE
Beaverlodge
McLennan
High Prairie
Lesser Slave Lake
Slave Lake
Smith
HOUSE MT.
3950'
MARTEN MT.
2900'
PELICAN MT.
2682'
WABASCA
N. Wabiskaw L.
S. Wabiskaw L.
Utikuma L.
Fawcett L.
Calling L.
GAS TURBINE
SWAN HILLS
SIMONETTE
ATHABASCA
Lac La Biche
Heart L.
Touchwood L.
Spencer L.
Christina L.
Winefred L.
Wappau L.
Cheecham
Garson L.
Primrose L.
Cold L.
Marie L.
Bonnyville
Ashmont
St. Paul
Waskatenau
Westlock
Barrhead
Whitecourt
Sangudo
Morinville
Bruderheim
Lac Ste. Anne
Edson
Evansburg
Wabamun L.
Stony Plain
EDMONTON
Tofield
New Sarepta
VEGREVILLE
Mundare
Willingdon
Innisfree
VERMILION
LLOYDMINSTER
Heinsburg
Elk Point
Viking
CAMROSE
WETASKIWIN
Daysland
Irma
WAINWRIGHT
Edgerton
Hardisty
Hughenden
Provost
Macklin
Paradise Valley
Alliance
STETTLER
Bashaw
Buffalo L.
Rimbey
Gull L.
ROCKY MOUNTAIN HOUSE
Nordegg
RED DEER
Entrance
Coalspur
Luscar
Foothills
Mountain Park
Jasper
Yellowhead Pass 3,728'
Mt. Robson 12,972'
Mt. Edith Cavell 11,033'
Mt. Fryatt 11,026'
Mt. Alberta 11,874'
Sunwapta Pass
Mt. Athabaska
Athabaska River
Smoky R.
Berland River
Hay R.
Snake Indian R.
North Saskatchewan
Brazeau R.
Nordegg R.
Pembina R.
Battle R.
Ram River
INTERPROVINCIAL BOUNDARY
SASKATCHEWAN
ROCK



ALBERTA

PROVINCE OF
ALBERTA
CANADA

ALBERTA POWER COMMISSION
MAP OF TRANSMISSION LINES IN PROVINCE OF ALBERTA

19 62

Scale: 1 Inch = 20 Miles

20 0 20 40 60

LEGEND

TRANSMISSION LINES	132 K.V. & OVER	SERVICE AREA	
" "	33 K.V. TO 72 K.V.	CALGARY POWER	▨
" "	UNDER 33 K.V.		
POWER PLANTS	- STEAM ●	CANADIAN UTILITIES	▨
	- HYDRO ▲		
	- INTERNAL COMBUSTION ■	NORTHLAND UTILITIES	▨

COMPILED AND DRAWN IN THE TECHNICAL DIVISION, DEPARTMENT OF LANDS AND FORESTS, EDMONTON, ALBERT